AD-A103 775 NEW JERSEY DEPT OF ENVIRONMENTAL PROTECTION TRENTON --ETC F/G 13/13
NATIONAL DAM SAFETY PROGRAM. MINE HILL RESERVOIR DAM (NJ00777), --ETC(U)
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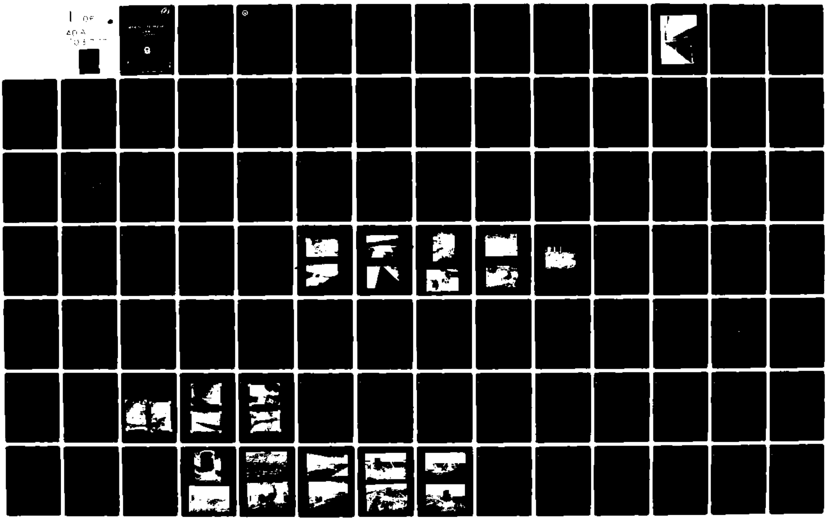

LEVEL II

AD-A103775

DELAWARE RIVER BASIN
MINE BROOK, MORRIS COUNTY
NEW JERSEY

MINE HILL RESERVOIR DAM
NJ 00777

PHASE 1 INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

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DEPARTMENT OF THE ARMY

Philadelphia District
Corps of Engineers
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AUGUST 1981

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REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

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4. TITLE (and Subtitle): Phase I Inspection Report National Dam Safety Program. Mine Hill Reservoir Dam (NJ00777), Morris County, N.J.	5. TYPE OF REPORT & PERIOD COVERED: FINAL rept.
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19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Dams
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Structural Analysis
National Dam Safety Program
Mine Hill Reservoir Dam, N.J.
Seepage
Spillways
Erosion

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report cites results of a technical investigation as to the dam's adequacy. The inspection and evaluation of the dam is as prescribed by the National Dam Inspection Act, Public Law 92-367. The technical investigation includes visual inspection, review of available design and construction records, and preliminary structural and hydraulic and hydrologic calculations, as applicable. An assessment of the dam's general condition is included in the report.

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Honorable Brendan T. Byrne
Governor of New Jersey
Trenton, New Jersey 08621

31 AUG 1981

Dear Governor Byrne:

Inclosed is the Phase I Inspection Report for Mine Hill Reservoir Dam in Morris County, New Jersey which has been prepared under authorization of the Dam Inspection Act, Public Law 92-367. A brief assessment of the dam's condition is given in the front of the report.

Based on visual inspection, available records, calculations and past operational performance, Mine Hill Reservoir Dam, initially listed as a high hazard potential structure, but reduced to a significant hazard potential structure as a result of this inspection, is judged to be in fair overall condition. The dam's spillway is considered inadequate because a flow equivalent to 3 percent of the Spillway Design Flood - SDF - would cause the dam to be overtopped. (The SDF, in this instance, is one half of the Probable Maximum Flood). To ensure adequacy of the structure, the following actions, as a minimum, are recommended:

a. The spillway's adequacy should be determined by a qualified professional consultant engaged by the owner using more sophisticated methods, procedures and studies within six months from the date of approval of this report. Within three months of the consultant's findings remedial measures to ensure spillway adequacy should be initiated.

b. Within one year from the date of approval of this report the owner should engage a qualified professional consultant to perform the following:

(1) Design and oversee repairs for the eroded areas on the downstream slope and adjacent to the principal spillway wingwalls.

(2) Design and oversee procedures for the removal of trees from the slope downstream of the dam for a distance of about 25 feet or to the property line, whichever is less, from the downstream face of the concrete capping on to the right of the emergency spillway.

(3) Investigate the minor seepage at the left abutment of the dam and design and oversee required corrective measures.

(4) Design necessary remedial measures to prevent undermining of the downstream principal spillway apron by flow in the spillway channel downstream from the spillway.

(5) Design and oversee repairs to the concrete principal spillway training walls.

(6) Relocate the gate valves on the 10-inch water supply and draw-down lines to place them at or near the inlets on the upstream side of the dam.

c. Within one year from the date of approval of this report the following remedial actions should be initiated:

(1) Cut small trees growing in the stone masonry wall on the downstream face of the dam.

(2) Repair service bridge.

(3) Repair stoplog and supports.

(4) Repair concrete spalling on numerous surfaces on the dam.

(5) Replace concrete joint filler.

d. The owner should develop written operating procedures and a periodic maintenance plan to ensure the safety of the dam, within one year from the date of approval of this report.

e. An emergency action plan and warning system should be developed which outlines actions to be taken by the owner to minimize the downstream effects of an emergency at the dam within six months from the date of approval of this report.

A copy of the report is being furnished to Mr. Dirk C. Hofman, New Jersey Department of Environmental Protection, the designated State Office contact for this program. Within five days of the date of this letter, a copy will also be sent to Congressman Courter of the Thirteenth District. Under the provision of the Freedom of Information Act, the inspection report will be subject to release by this office, upon request, five days after the date of this letter.

Additional copies of this report may be obtained from the National Technical Information Services (NTIS), Springfield, Virginia 22161 at a reasonable cost. Please allow four to six weeks from the date of this letter for NTIS to have copies of the report available.

NAPEN-N
Honorable Brendan T. Byrne

An important aspect of the Dam Inspection Program will be the implementation of the recommendations made as a result of the inspection. We accordingly request that we be advised of proposed actions taken by the State to implement our recommendations.

Sincerely,

Roger L. Baldwin

Incl
As stated

ROGER L. BALDWIN
Lieutenant Colonel, Corps of Engineers
Commander and District Engineer

Copies furnished:
Mr. Dirk C. Hofman, P.E., Deputy Director
Division of Water Resources
N.J. Dept. of Environmental Protection
P.O. Box CN029
Trenton, NJ 08625

Mr. John O'Dowd, Acting Chief
Bureau of Flood Plain Regulation
Division of Water Resources
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Trenton, NJ 08625

MINE HILL RESERVOIR DAM (NJ00777)

CORPS OF ENGINEERS ASSESSMENT OF GENERAL CONDITIONS

This dam was inspected on 21 April 1981 by Anderson-Nichols and Co. Inc., under contract to the State of New Jersey. The State, under agreement with the U.S. Army Engineer District, Philadelphia, had this inspection performed in accordance with the National Dam Inspection Act, Public Law 92-367.

Mine Hill Reservoir Dam, initially listed as a high hazard potential structure, but reduced to a significant hazard potential structure as a result of this inspection, is judged to be in fair overall condition. The dam's spillway is considered inadequate because a flow equivalent to 3 percent of the Spillway Design Flood - SDF - would cause the dam to be overtopped. (The SDF, in this instance, is one half of the Probable Maximum Flood). To ensure adequacy of the structure, the following actions, as a minimum, are recommended:

a. The spillway's adequacy should be determined by a qualified professional consultant engaged by the owner using more sophisticated methods, procedures and studies within six months from the date of approval of this report. Within three months of the consultant's findings remedial measures to ensure spillway adequacy should be initiated.

b. Within one year from the date of approval of this report the owner should engage a qualified professional consultant to perform the following:

(1) Design and oversee repairs for the eroded areas on the downstream slope and adjacent to the principal spillway wingwalls.

(2) Design and oversee procedures for the removal of trees from the slope downstream of the dam for a distance of about 25 feet or to the property line, whichever is less, from the downstream face of the concrete capping on to the right of the emergency spillway.

(3) Investigate the minor seepage at the left abutment of the dam and design and oversee required corrective measures.

(4) Design necessary remedial measures to prevent undermining of the downstream principal spillway apron by flow in the spillway channel downstream from the spillway.

(5) Design and oversee repairs to the concrete principal spillway training walls.

(6) Relocate the gate valves on the 10-inch water supply and draw-down lines to place them at or near the inlets on the upstream side of the dam.

c. Within one year from the date of approval of this report the following remedial actions should be initiated:

(1) Cut small trees growing in the stone masonry wall on the downstream face of the dam.

(2) Repair service bridge.

(3) Repair stoplog and supports.

(4) Repair concrete spalling on numerous surfaces on the dam.

(5) Replace concrete joint filler.

d. The owner should develop written operating procedures and a periodic maintenance plan to ensure the safety of the dam, within one year from the date of approval of this report.

e. An emergency action plan and warning system should be developed which outlines actions to be taken by the owner to minimize the downstream effects of an emergency at the dam within six months from the date of approval of this report.

APPROVED: Roger L. Baldwin

ROGER L. BALDWIN
Lieutenant Colonel, Corps of Engineers
Commander and District Engineer

DATE: 31 Aug 81

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam:	Mine Hill Reservoir
Identification No.:	Fed ID No. NJ00777
State Located:	New Jersey
County Located:	Morris
Stream:	Mine Brook
River Basin:	Delaware
Date of Inspection	April 21, 1981

ASSESSMENT OF GENERAL CONDITIONS

Mine Hill Reservoir Dam is an 85-year old concrete and stone masonry dam in fair overall condition. It is small in size and has a significant hazard classification. There is some leakage from the dam, with spalling and cracking of the surface concrete. The principal spillway is a 12-foot stoplog weir, with uncontrolled discharge also occurring from an 8-inch pipe and a 12-foot overflow emergency spillway. The total ungated spillway capacity at the crest of the main dam embankment would pass less than 2 percent of the one-half probable maximum flood inflow hydrograph outflow. The spillway capacity of Mine Hill Reservoir Dam is inadequate.

It is recommended that the owner retain the services of a professional engineer, qualified in the design and inspection of dams, to accomplish the following tasks in the near future: investigate the adequacy of the spillway capacity and design and oversee remedial measures as needed; design and oversee repairs for the eroded areas on the downstream slope and near the spillway wingwalls; design and oversee procedures for the removal of trees from the slope downstream of the dam; investigate the minor seepage at the left abutment and design and oversee required corrective measures; design necessary remedial measures to prevent undermining of the downstream principal spillway apron; design and oversee repairs to the concrete principal spillway walls; and relocate the gate valves on the 10-inch water supply and draw-down lines to place them at or near the inlets on the upstream side of the dam. It is further recommended that the owner undertake the following as a part of operating and maintenance procedures. In the near future: develop written operating procedures and a periodic maintenance plan to ensure the safety of the dam; cut small

trees growing in the masonry wall on the dam's downstream face; repair the bridge to the masonry intake tower; repair the stoplogs and supports; repair the concrete spalling on the dam; and replace concrete joint filler.

ANDERSON-NICHOLS & COMPANY, INC.

Warren A. Guinan

Warren A. Guinan, P.E.
Project Manager
New Jersey No. 16848

OVERVIEW PHOTO

MINE HILL RESERVOIR DAM

April 21, 1981

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test Flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonable possible storm runoff), or fractions thereof. The test flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

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NATIONAL DAM SAFETY REPORT

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PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY INSPECTION PROGRAM
MINE HILL RESERVOIR DAM
FED ID NO. #NJ00777

SECTION 1
PROJECT INFORMATION

1.1 General

a. Authority. Authority to perform the Phase I Safety Inspection of Mine Hill Reservoir Dam was received from the State of New Jersey, Department of Environmental Protection, Division of Water Resources by letter dated 12 December 1980 under Basic Contract No. FPM-39 and Contract No. A01093 dated 10 October 1979. This Authority was given pursuant to the National Dam Inspection Act, Public Law 92-367 and by agreement between the State and the U.S. Army Engineers District, Philadelphia. The inspection discussed herein was performed by Anderson-Nichols & Company, Inc.

b. Purpose: The purpose of the Phase I Investigation is to develop an assessment of the general conditions with respect to the safety of Mine Hill Reservoir Dam and appurtenances. Conclusions are based upon available data and visual inspection. The results of this inspection are used to determine any need for emergency measures and to conclude whether or not additional studies, investigations, and analyses are necessary and warranted.

1.2 Project Description

a. Description of Dam and Appurtenances. Mine Hill Reservoir Dam (known locally as Lower Mine Hill Reservoir Dam) is a granite masonry structure with a concrete upstream facing and cap. The dam crest varies in elevation, and is about 27 feet above the low point on dam's toe. The principal spillway is a 12-foot long stoplog weir on the right (north) end of the dam. There is also an open 8-inch transite pipe in the dam's crest, with its invert slightly lower than the crest of the stoplogs. The emergency spillway is a 12-foot long notch in the dam's crest, only slightly lower than the crest. The total length of the dam and spillways is about 310 feet.

Two 10-inch gated pipes in the reservoir can be used as low-level outlets. One of the pipes is located at the base of a 13.2 foot diameter masonry tower located in the reservoir. The inlet to the other pipe is in the upstream face of the dam. The pipes are controlled by valves located on the downstream slope of the dam. One of these pipes leads to the Hackettstown Municipal Utility Authority's water treatment plant, while the other is for use as a blow-off line. These pipes are interconnected near the valve box.

b. Location. The Dam is located in Mount Olive Township, New Jersey, on Mine Brook. It is about 1 mile east of the City of Hackettstown, east of Route 46 on an unimproved road. The dam is at 40° 50.5' north latitude and 74° 48.0' west longitude on the Hackettstown U.S. Geological Survey Quadrangle Map. A location map is included as Figure 2.

c. Size Classification. Mine Hill Reservoir Dam is classified as being small in size on the basis of storage at the dam crest of 35.3 acre-feet, which is less than 1000 acre-feet, and on the basis of its structural height of 30 feet, which is more than 25 feet and less than 40 feet, in accordance with criteria given in the Recommended Guidelines for Safety Inspection of Dams.

d. Hazard Classification. Visual inspection indicated that there are a group of houses on Mine Brook about 3400 feet downstream of the dam. In view of the potential for economic damage and the loss of few, if any lives, Mine Hill Reservoir Dam is classified as significant hazard.

e. Ownership. Mine Hill Reservoir Dam is owned by the Hackettstown Municipal Utility Authority, P.O. Box 450, Hackettstown, New Jersey 08903. Mr. Joseph Richards can provide information about the dam, and can be reached at the above address.

f. Purpose. Mine Hill Reservoir Dam is used as part of the water supply for the City of Hackettstown, New Jersey.

g. Design and Construction History. The original plans and design notes for Mine Hill Dam, which was constructed in 1896, were not available. Repairs were made to the dam in 1943-44 and again in 1964 (See Appendix 4).

h. Normal Operation Procedure. Mine Hill Reservoir Dam is operated for water supply, with one of the two 10-inch gated pipes used to convey water to a 1.0 MGD treatment plant as needed. Mr. Joseph Richards of the Hackettstown Municipal Utility Authority stated that the Authority generally removes the stoplogs from the principal spillway prior to large storms to preserve water quality in the reservoir.

i. Site Geology. No site specific geologic information (such as borings) was available at the time the dam was inspected. Information derived from the Geologic Map of New Jersey (Kummel and Lewis, 1912) indicates soils within the immediate site consist of ground moraine overlying bedrock. Bedrock was observed in sporadic outcrops at the left abutment during inspection of this dam. The previously mentioned map indicates that bedrock in this area consists of granitoid gneiss of Precambrian age.

1.3 Pertinent Data

a. Drainage Area

1.77 square miles

b. Discharge at Damsite (cfs)

Maximum flood at damsite - unknown
Total ungated spillway capacity at top of dam - 46 cfs with stop logs in place; 238 cfs with stop logs removed

c. Elevation (ft. above NGVD)

Top of dam - 802.0

Spillway Design Flood (SDF) - 804.8

Normal pool (at time of inspection) - 800.5

Spillway crest - 800.7 invert of 8-inch pipe
- 801.0 crest of stoplogs, principal spillway
- 798.4 principal spillway crest with stoplogs removed
- 801.9 emergency spillway crest

Streambed at centerline of spillway - 775 (toe of dam below 8-inch AC pipe)

Maximum tailwater at emergency spillway - 778 (estimate)

d. Reservoir length (feet)

Maximum pool - 700 (estimated)

Spillway crest - 600 (estimated)

e. Storage (acre-feet)

Spillway crest - at 800.7 ft. = 31.9
- at 801.0 ft. = 32.7

Top of dam - at 802.0 ft. = 35.3

Test Flood (PMF) - at 804.8 ft. = 43

f. Reservoir Surface (acres)

Top of dam - 2.9

Emergency spillway crest - 2.9

Principal spillway crest - 2.9

g. <u>Dam</u>

Type - masonry and concrete

Length - 310.5 feet (includes spillways)

Height - 27 feet (hydraulic)

- 30 feet (structural)

Top width - ranges 3 to 10 feet

Side slopes - upstream vertical; downstream varies from 1H:3V to 2H:1V

Zoning - not applicable

Impervious core - unknown

Cutoff - unknown

Grout curtain - unknown

h. <u>Principal Spillway and Ungated Pipe</u>

	Principal Spillway	8-Inch Pipe
Type	Stoplog weir	8-inch AC (ungated)
Length of weir	12 feet	Not applicable
Elevation (feet above NGVD)	Crest without stoplogs = 798.4 Crest with stoplogs = 801.0	Invert = 800.7
U/S Channel	20-foot wide channel	Reservoir
D/S Channel	Steep, rocky channel	Free outfall

Note: Two concrete weir sections on either side of stoplog spillway, at slightly higher elevation. Length 5' on right, 10.5' on left.

i. <u>Emergency Spillway</u>

Type	Concrete overflow weir
Length	12 feet
Crest elevation (feet above NGVD)	801.9
U/S Channel	Reservoir
D/S Channel	Free outfall

j. Regulating Outlets

	Pipe to Water Treatment Plant	Draw Down Pipe
Type	CIP	CIP
Diameter (inches)	10	10
Invert (feet above NGVD)	about 780.5	about 775
Control	Valve on D/S slope of dam	Valve on d/s slope of dam (outlet covered by flange plate bolted to pipe)
U/S Channel	Reservoir	Reservoir
D/S Channel	10" pipe to water treatment plant	Free outfall

SECTION 2
ENGINEERING DATA

2.1 Design

No original plans, hydraulic or hydrologic data for Mine Hill Reservoir Dam were found.

2.2 Construction

Mine Hill Reservoir Dam was originally constructed in 1896 with major repairs undertaken in 1943-44 and 1964. A letter report describing the repairs undertaken in 1964 was available in the files of the New Jersey Department of Environmental Protection. This report is included in Appendix 4, Engineering Data.

2.3 Operation

The Hackettstown Municipal Utility Authority uses the Mine Hill Reservoir for water supply and draws water according to need.

2.4 Evaluation

a. Availability. A search of the New Jersey Department of Environmental Protection files revealed very little information. All available information was retrieved.

b. Adequacy. The engineering data available on this dam, together with data from visual observations, was adequate to allow evaluation of the dam for this Phase I Inspection.

SECTION 3
VISUAL INSPECTION

3.1 Findings

a. Dam.

Small trees are growing in the vertical masonry wall near the downstream edge of the dam crest. A slight amount of seepage was noted between masonry blocks near the crest of the dam and at the contact of the dam with the left abutment. Seepage was clear with no evidence of suspended fines. An earth berm is located downstream of the vertical masonry wall. The berm extends from the low-level outlet on the left side of the dam to the right spillway channel. Extensive erosion has occurred along the contact between the berm and the vertical masonry wall. Numerous trees up to 10 inches in diameter have been planted on the downstream slope of the berm. Erosion gullies up to 3 feet deep have occurred on the downstream slope and adjacent to the left spillway wingwall. Flowing water associated with an 8-inches diameter pipe which extends from the upstream face of the dam and terminates at the downstream slope near the left spillway wingwall may have been responsible for erosion and sloughing of the downstream slope near the end of the left spillway wingwall.

Some cracking (1/8 inch wide) on the upstream gunite facing was noted. The concrete cap is spalled in an area near the service bridge and some of the joint filler is missing. The masonry mortar is generally cracked over the entire downstream face of the dam. There are numerous rusting steel rods protruding through the upstream face.

b. Appurtenant Structures

1. Gated Spillway

Considerable erosion has occurred along the floor of the spillway discharge channel. Seepage water is discharging near the end of the left spillway training wall. The water is clear with no evidence of suspended fines. Water flowing in the spillway discharge channel passes underneath the spillway apron through openings between the stones approximately 20 feet from the end of the apron.

The spillway channel walls on both sides, upstream and downstream of the stoplogs, are generally cracked and spalled. Continuous undermining of the concrete walls at the base was observed. The bottom of the channel is open stone which permits discharge water to infiltrate. The wooden stoplogs are badly deflected and the center support is bent.

2. Outlet Works

The valve boxes for the two 10-inch low-level outlet pipes were visible at the time of the inspection. Although the valves were not tested, Mr. Joseph Richards of the Hackettstown Municipal Utility Authority stated that they are in operating condition.

The main beams of the service bridge to the masonry tower are badly rusted and the wood deck is weathered.

c. Reservoir Area

The watershed above the lake is gently to steeply sloping. Slopes on the shore of the lake appear to be stable. No evidence of significant sedimentation was observed.

d. Downstream Channel

Erosion has occurred on the right and left banks of the channel immediately downstream of the end of the principal spillway apron for a distance of 100 to 200 feet. Numerous trees have fallen into the channel and the channel bottom is covered with debris and boulders.

SECTION 4
OPERATIONAL PROCEDURES

4.1 Procedures

The owner withdraws water from the reservoir as needed for municipal water supply. Water is withdrawn to Hackettstown's water filtration plant by a 10-inch pipe controlled by a valve on the downstream slope of the dam.

4.2 Maintenance of Dam

Mr. Joseph Richards of the Hackettstown Municipal Utility Authority stated that their engineer conducts annual inspections of the dam.

4.3 Maintenance of Operating Facilities

No formal maintenance procedures for the operating facilities were disclosed. The fact that the reservoir is used for water supply purposes requires the Authority to keep operating facilities functional.

4.4 Warning System

No description of any warning system was disclosed.

4.5 Evaluation of Operational Adequacy

The overall operation and maintenance procedures for the dam seemed adequate. The remedial measures described in Section 7.2 should be implemented as prescribed.

SECTION 5
HYDROLOGIC/HYDRAULIC

5.1 Evaluation of Features

a. Design Data. Because no hydrologic or hydraulic data were revealed, an evaluation could not be performed.

b. Experience Data. No experience data were found.

c. Visual Inspections. No evidence of past overtopping of the dam crest was noted. Owing to the extremely steep stream channel downstream of the dam, it does not appear likely that tailwater conditions would affect spillway outflow. Valving of the 10-inch CIPs is on the downstream side of the dam; because these are located in the embankment section, a rupture above the valves would wash out the embankment.

d. Overtopping Potential. The hydraulic/hydrologic evaluation for the dam is based on a selected Spillway Design Flood (SDF) equal to one-half the Probable Maximum Flood (PMF) in accordance with the range of test floods given in the evaluation guidelines for dams classified as significant hazard and small in size. The PMF was determined by application of a 24-hour Probable Maximum Precipitation (PMP) of 23.2 inches to the SCS dimensionless unit hydrograph. Hydrologic computations are given in Appendix 3. The routed one-half PMF peak outflow from the reservoir is 3,548 cfs.

Water will rise to elevation 802.0, one foot above the principal spillway with stoplogs in place, before overtopping the low point on the crest of the major part of the dam. Under this head the project's ungated outflow capacity is 46 cfs, which is less than the selected SDF.

Flood routing calculations indicate that Mine Hill Reservoir Dam will be overtopped for 12.9 hours to a maximum depth of 2.8 feet under one-half PMF conditions. It is estimated that the emergency spillway can pass 2 percent of the Spillway Design Flood inflow hydrograph, which is one-half the Probable Maximum Flood, without overtopping the dam. If the stoplogs were removed, the spillway could pass about 238 cfs before being overtopped, which is still only 6 percent of the one-half PMF inflow hydrograph.

e. Draw Down. Assuming no inflow, the reservoir pool can be drawn down in about two days using the two 10-inch valved pipes which serve as low-level outlets. Thus the drawdown capacity of this dam is adequate.

SECTION 6
STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

Small trees growing in the vertical masonry wall on the downstream face near the crest will cause continuing deterioration of that wall and may result in seepage or erosion problems.

Minor leakage through joints between masonry blocks on the downstream face could lead to stability problems.

The trees growing on the downstream berm may blow over and pull out their roots or they may die with the result that their roots rot. In either case, severe seepage and erosion problems could result if the roots extend between the masonry blocks of the downstream face. Erosion on the surface of the berm, if not controlled, could contribute to stability problems in the dam if significant portions of the berm are eroded away.

Minor seepage is occurring at the contact of the masonry dam and the left rock abutment could result in failure of the dam, if not controlled. Because of freezing and thawing action, such seepage, if not controlled, could result in a serious problem.

Erosion along the discharge channel apron may undermine the spillway apron and cause collapse of the spillway wingwalls.

Based on the visual inspection alone, it is not possible to determine the character of the dam and spillway foundations or the interior of the cross section of the downstream berm or the slope of the upstream side of the masonry stone wall. Therefore, it is not possible to evaluate the factor of safety of the dam against slope failure, sliding, or overturning.

6.2 Design and Construction Data

No design or construction data pertinent to the structural stability of the dam are available.

6.3 Operating Records

No operating records pertinent to the structural stability of the dam were available.

6.4 Post-Construction Changes

Repairs to the dam were carried out in 1943-1944 and again in 1964. In the 1940's, a gunite upstream facing was placed on the dam. In 1964, this gunite facing was replaced, and

pressure grouting used to replace old mortar in the masonry. A trench about 3 feet deep was dug along the base of the dam, the masonry was sealed and gunite facing applied; the trench was backfilled with mud from the reservoir bottom.
(See Appendix 4.)

6.5 Seismic Stability

This dam is in Seismic Zone 1. According to the Recommended Guidelines, dams located in Seismic Zone 1 "may be assumed to present no hazard from earthquake provided static stability conditions are satisfactory and conventional safety margins exist." None of the visual observations made during the inspection are indicative of unstable conditions. However, because no data are available concerning the engineering properties of the embankment and foundation materials for this dam, is not possible to make an engineering evaluation of stability or the factor of safety under static conditions.

SECTION 7
ASSESSMENT, RECOMMENDATIONS/REMEDIAL MEASURES

7.1 Dam Assessment

a. Condition. Mine Hill Reservoir Dam is 85 years old and in fair condition.

b. Adequacy of Information. The information available is such that the assessment of the dam must be based primarily on the results of the visual inspection.

c. Urgency. The recommendations made in 7.2.a and 7.2.b. should be implemented by the owner as prescribed.

d. Necessity for Additional Data/Evaluation. The information available from the visual inspection is adequate to identify the potential problems which are listed in 7.2.a. These problems require the attention of a professional engineer who will have to make additional engineering studies to design or specify remedial measures to rectify the problems. If left unattended, the problems could lead to failure of the dam.

7.2 Recommendation/Remedial Measures

a. Recommendations. The owner should retain a professional engineer qualified in the design and construction of dams to accomplish the following in the near future:

(1) Investigate the adequacy of the spillway capacity and design and oversee remedial measures as needed.

(2) Design and oversee repairs for the eroded areas on the downstream slope and adjacent to the principal spillway wingwalls.

(3) Design and oversee procedures for the removal of trees from the slope downstream of the dam for a distance of about 25 feet or to the property line, whichever is less, from the downstream face of the concrete capping on to the right of the emergency spillway.

(4) Investigate the minor seepage at the left abutment of the dam and design and oversee required corrective measures.

(5) Design necessary remedial measures to prevent undermining of the downstream principal spillway apron by flow in the spillway channel downstream from the spillway.

(6) Design and oversee repairs to the concrete principal spillway training walls.

(7) Relocate the gate valves on the 10-inch water supply and draw-down lines to place them at or near the inlets on the upstream side of the dam.

b. Operating and Maintenance Procedures. The owner should accomplish the following in the near future:

(1) Develop written operating procedures and a periodic maintenance plan to ensure the safety of the dam.

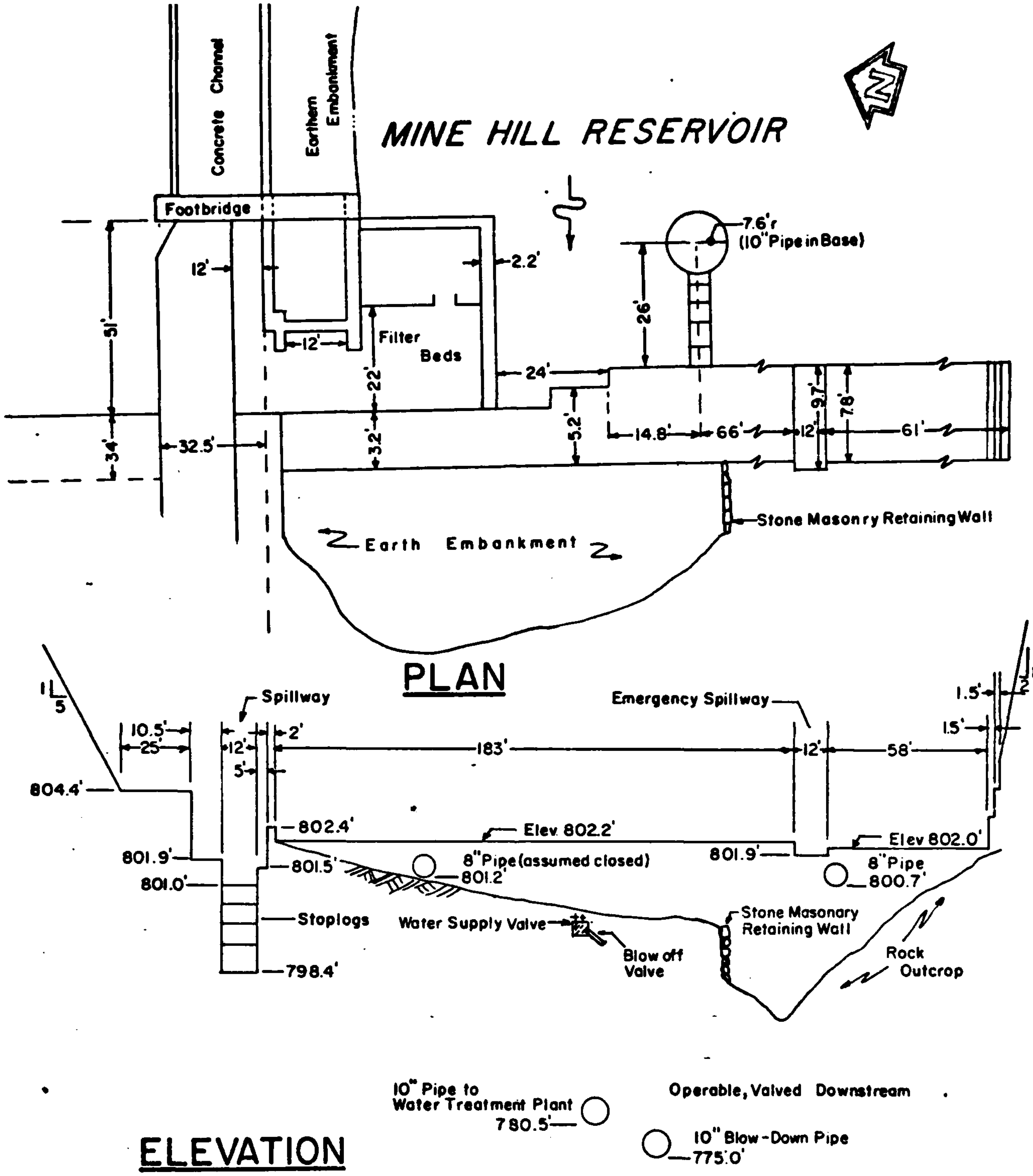
(2) Cut small trees growing in the stone masonry wall on the downstream face of the dam.

(3) Repair service bridge.

(4) Repair stoplog and supports.

(5) Repair concrete spalling on numerous surface on the dam.

(6) Replace concrete joint filler.



Anderson-Nichols & Co, Inc BOSTON MASSACHUSETTS	U.S. ARMY ENGINEER DIST PHILADELPHIA CORPS OF ENGINEERS PHILADELPHIA, PA

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

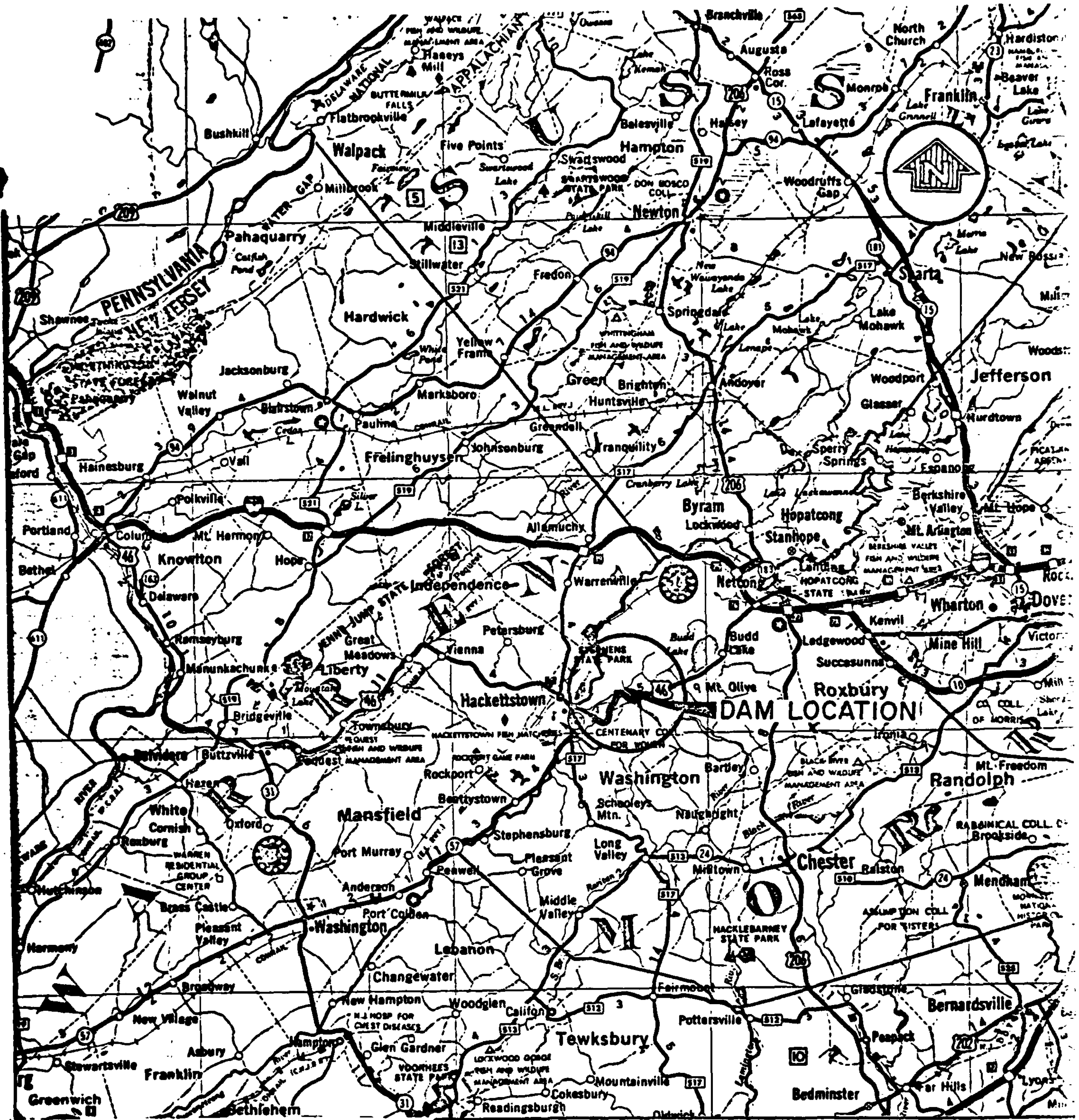
MINE HILL RESERVOIR DAM

MINE BROOK NEW JERSEY

SCALE: NOT TO SCALE

DATE: JUNE 1981

FIGURE - I



Anderson-Nichols & Co., Inc.
BOSTON MASSACHUSETTS

U.S. ARMY ENGINEER DIST. PHILADELPHIA
CORPS OF ENGINEERS
PHILADELPHIA, PA.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

MINE HILL RESERVOIR DAM
LOCATION MAP

MINE BROOK NEW JERSEY

SCALE: 1" = 4 Miles Approx.
DATE:

SCALE IN MILES

0 4 8

MAP BASED ON STATE OF NEW JERSEY
OFFICIAL MAP & GUIDE.

FIGURE 2

APPENDIX 1

CHECK LIST

VISUAL INSPECTION

MINE HILL RESERVOIR

Check List
Visual Inspection
Phase 1

Name Dam Mine Hill Reservoir County Morris State NJ (00777) Coordinators NJDEP

Date(s) Inspection 2/19/81 4/21/81 Weather Overcast Clear Temperature 40° 45°

Pool Elevation at Time of Inspection 800.5 ft NGVD Tailwater at Time of Inspection none NGVD

Inspection Personnel:

Gilman	Stone
Guinan	Joseph Richards (Owner representative)
Murdock	

Gilman/Murdock/Stone Recorder

CONCRETE/MASONRY DAMS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SEEPAGE OR LEAKAGE	Leakage observed between masonry stone near crest of dam in vicinity of left abutment. Slight seepage between upper masonry blocks.	Investigate seepage and take remedial action as needed.
STRUCTURE TO ABUTMENT/EMBANKMENT JUNCTIONS	Slight seepage at left abutment junction. Some erosion evident at junction of dam with both abutments.	Investigate seepage and take remedial action as needed.
DRAINS	None	
WATER PASSAGES	None	
FOUNDATION	Dam appears to be founded on bedrock in the vicinity of left abutment.	

CONCRETE/MASONRY DAMS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS CONCRETE SURFACES	Some cracking (1/8-inch) on u/s concrete gunite facing. Top concrete slab has some spalling near bridge to outlet work (depth = 3/4-inch). D/s masonry mortar is cracked and spalled in numerous places. There are numerous rusting steel rods protruding through u/s face.	Repair u/s cracking and top slab spalling.
STRUCTURAL CRACKING	None	
VERTICAL AND HORIZONTAL ALIGNMENT	Good, no visual indication of either horizontal or vertical movement.	
MONOLITH JOINTS	Not applicable	
CONSTRUCTION JOINTS	Good, no indication of movement, some of elastic joint filler has been removed.	Replace damaged joint filler.
RAILINGS:	None	Appears to be a need of railing along top of dam.

GATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE SILL	Fair condition, some surface spalling and erosion. Top of right abutment is badly spalled and cracked.	Repair deteriorated concrete.
APPROACH CHANNEL	Unobstructed concrete walls are cracked and spalled - both sides. Bottom of channel is covered with silt and debris.	Repair deterioration.
DISCHARGE CHANNEL	Debris and trees in upper portion. Both sides are cracked and spalled. Continuous undermining of concrete walls at base. Bottom of channel placed stone - water is entering bottom of channel and exiting below spillway.	Repair undermining of concrete walls and spalling. Seal channel bottom.
BRIDGE AND PIERS	Not applicable	
GATES AND OPERATION EQUIPMENT	Wood stop logs are deflected d/s. Center support pipe is bent downstream.	Repair center support. Replace stop log w/stiffer planks.

UNGATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	Good condition - no deficiencies observed.	
APPROACH CHANNEL	Debris in channel.	
DISCHARGE CHANNEL	Bedrock bottom - clear and very steep.	
BRIDGE AND PIERS OVER SPILLWAY	Not applicable	

EMBANKMENT (Earth berm downstream of masonry stone section)

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	None	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	Considerable sloughing and erosion on the downstream slope - numerous trees present up to 11 in. diameter.	Repair eroded areas, remove trees.
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	Good	
RIPRAP FAILURES	Vertical concrete faced upstream section.	

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
RAILINGS	Not Applicable	
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	Erosion evident at both abutments and adjacent to right and left spillway wing walls.	Repair eroded areas
ANY NOTICEABLE SEEPAGE	Seepage between masonry blocks near crest of dam, also adjacent to right spillway wingwall and below spillway floor.	Investigate seepage and take remedial measures as needed.
STAFF GAGE AND RECORDER	Not Applicable	
DRAINS	None observed	

OUTLET WORKS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	Not visible	
INTAKE STRUCTURE	Good condition	
OUTLET PIPE	Rusted cast iron	
OUTLET CHANNEL	Steep bedrock channel, some debris, trees overhanging channel.	
EMERGENCY GATE	Not operated on day of inspection.	
SERVICE BRIDGE	Main beams are badly rusted. Wood deck is weathered w/some pieces in deteriorated condition. No railings.	Clean and paint. Replace deteriorated pieces and paint.

RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	Moderate to steeply sloped, heavily wooded.	
SEDIMENTATION	No noticeable sedimentation.	

DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	Trees on both sides of channel, considerable debris in channel	Because of the steep channel downstream, debris is not likely to create a backwater effect at the dam toe.
SLOPES	Very steep	
APPROXIMATE NO. OF HOMES AND POPULATION	5-10 houses adjacent to stream.	

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION

ITEM	REMARKS
PLAN OF DAM	None found
REGIONAL VICINITY MAP	Prepared for this report
CONSTRUCTION HISTORY	Constructed 1896, repairs 1943-44 and 1964
TYPICAL SECTIONS OF DAM	None
HYDROLOGIC/HYDRAULIC DATA	None
OUTLETS - PLAN	None found
- DETAILS	None found
- CONSTRAINTS	None found
- DISCHARGE RATINGS	None found
RAINFALL/RESERVOIR RECORDS	

ITEM	REMARKS
DESIGN REPORTS	None found
GEOLOGY REPORTS	None found
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	None found
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	None found
POST-CONSTRUCTION SURVEYS OF DAM	None found
BORROW SOURCES	Unknown

ITEM	REMARKS
MONITORING SYSTEMS	None
MODIFICATIONS	None
HIGH POOL RECORDS	None
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	1964 report describing repairs to dam
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	None
MAINTENANCE OPERATION RECORDS	None

ITEMS	REMARKS
SPILLWAY PLAN	
SECTIONS	Prepared for this report from field inspection
DETAILS	None
OPERATING EQUIPMENT PLANS & DETAILS	None

CHECK LIST
HYDROLOGIC AND HYDRAULIC DATA
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: 1.77 Square miles, mountainous, wooded, undeveloped

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 800.7' NGVD (31.9 acre-feet)

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY) Not applicable

ELEVATION MAXIMUM TEST FLOOD POOL: 806.3' NGVD (47.9 acre feet)

ELEVATION TOP DAM: 802.0 NGVD (35.3 acre-feet)

SPILLWAY CREST: Free overflow stoplog spillway

a. Elevation 801.0' NGVD

b. Type stoplogs

c. Width 2"

d. Length 12'

e. Location Spillover Right (north) side of dam

f. Number and Type of Gates four 8" high stoplogs

OUTLET WORKS: Two 10" pipes with gate valves on downstream slope

a. Type Corrugated metal pipe

b. Location in masonry tower and in dam face

c. Entrance Invert 775' NGVD and 780.5' NGVD (estimated)

d. Exit Invert 775' NGVD AND 780.5' NGVD

HYDROMETEOROLOGICAL GAGES: None

MAXIMUM NON-DAMAGING DISCHARGE: 46 cfs before overtopping with stoplogs in place; 238 cfs with stoplogs removed

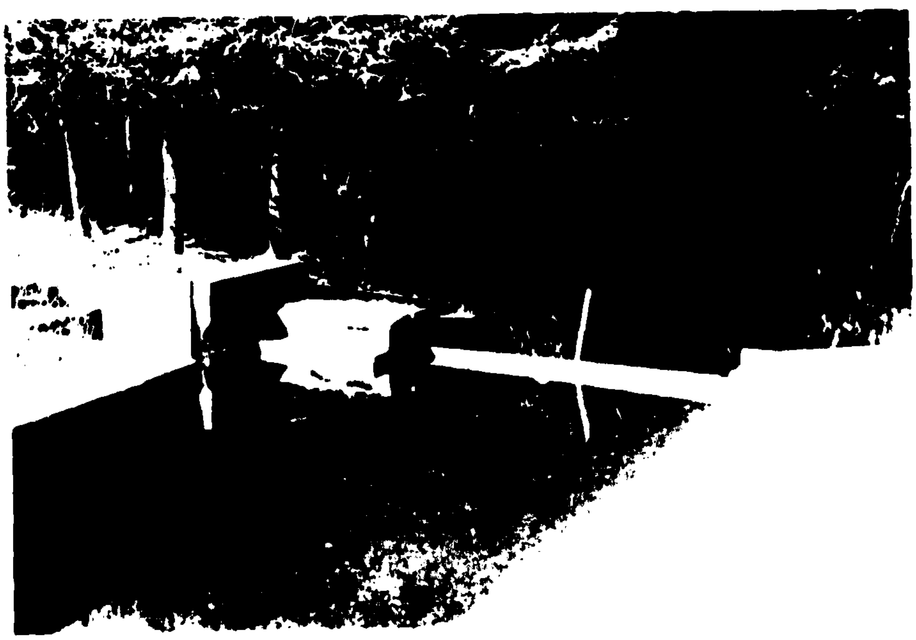
APPENDIX 2

PHOTOGRAPHS

MINE HILL RESERVOIR DAM

April 21, 1981

View looking u/s in spillway channel.



April 21, 1981

View of spillway approach channel. Stoplogs in place on spillway crest.

April 21, 1981

View of spalled concrete caps on partitioned box at diversion from canal. Note stoplog notches on either side of opening.

April 21, 1981

Looking along axis of dam crest from the right (north).

April 21, 1981

View of d/s face of dam looking toward left abutment contact with natural rock face. Note seepage through masonry on face below spillway notch.

April 21, 1981

View of seepage exiting underneath end of right spillway training wall.

April 21, 1981

View of seepage on face of dam and small trees growing between the stones which are retaining a portion of the downstream embankment section.

April 21, 1981

View of valve box for blowoff and water supply lines.

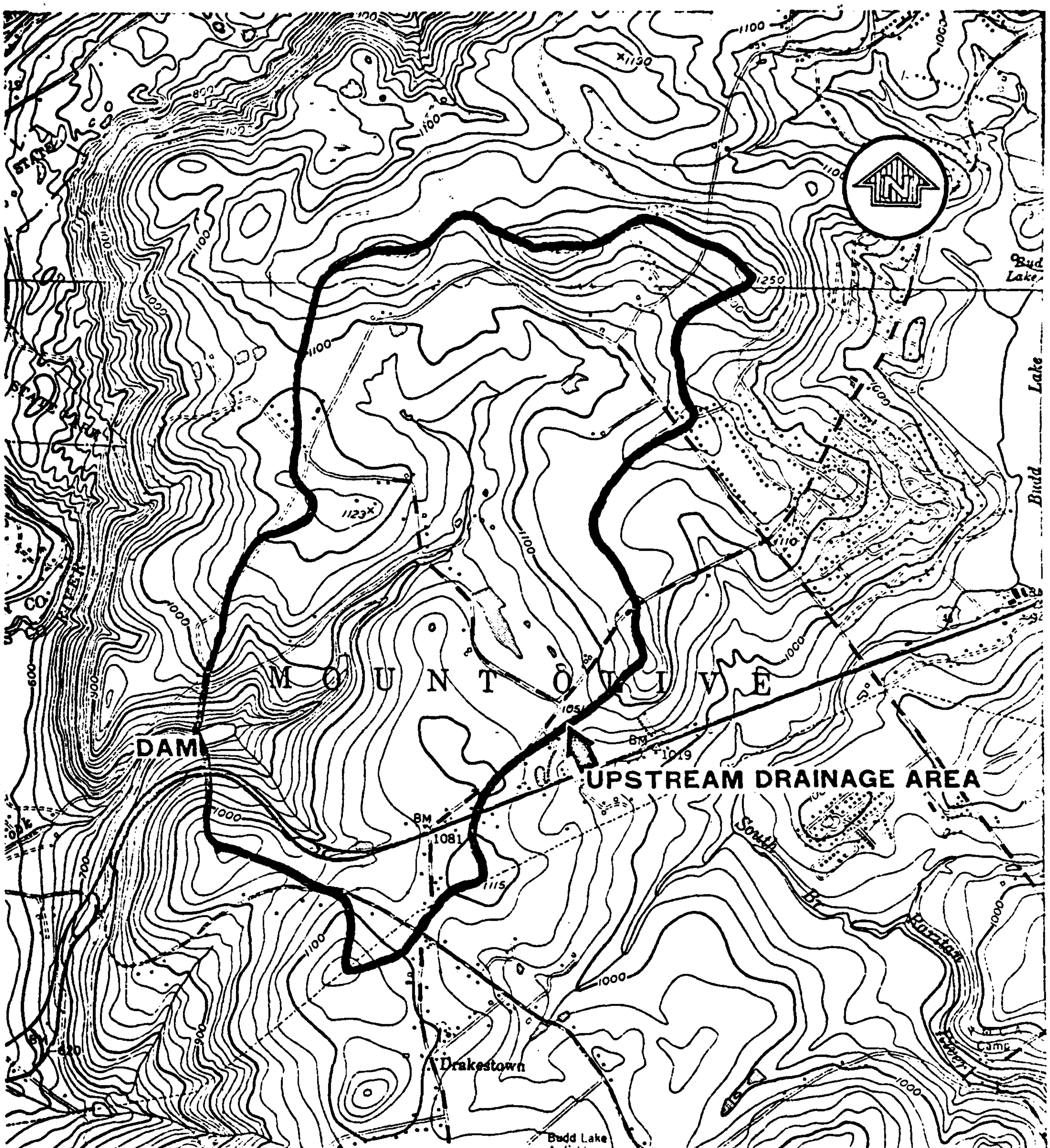
April 21, 1981

View of erosion up to 3 ft deep occurring on downstream slope.

APPENDIX 3

HYDROLOGIC COMPUTATIONS

MINE HILL RESERVOIR DAM



NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

MINE HILL RESERVOIR

MOUNT OLIVE TOWNSHIP, NEW JERSEY

REGIONAL VICINITY MAP

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA

Anderson-Nichols & Company, Inc. BOSTON, MA.

SCALE IN MILES

0 1/2 1

MAP BASED ON U.S.G.S. 7.5 MINUTE QUADRANGLE SHEETS. TRANQUILITY, N.J., 1954, REVISED 1971, AND HACKETTSTOWN, N.J., 1953, REVISED 1971.

Anderson-Nichols & Company, Inc. Subject: ______

Sheet No. 1 of 13
Date 6/15/81
Computed TCG
Checked CRP

JOB NO.

SQUARES 1/4 IN. SCALE

TIME OF CONCENTRATION

① Texas Highway Method

<u>overland</u>

longest path overland ≈ 3,000 feet

$$\text{slope} \cong \frac{170\text{ ft}}{3{,}000\text{ ft}} = 5.6$$

for woods, velocity = 2.0 fps*

<u>channel</u>

length = 7,500 feet

$$\text{slope} = \frac{1{,}075-800}{7{,}500} = 3.7\%$$

velocity = 3.0 fps*

$$\text{Time} = \text{overland} + \text{channel} = \frac{3{,}000\text{ ft}}{2\text{ fps}} + \frac{7{,}500\text{ ft}}{3\text{ fps}} = 4{,}000\text{ sec} = 1.11\text{ hrs}$$

② Soil & Water Conservation

$$L = 0.6\,T_c = \frac{\ell^{0.8}\,(S+1)^{1.67}}{9{,}000\,y^{0.5}} \qquad S = \frac{1{,}000}{CN} - 10$$

$$y = \frac{1235-800}{10{,}500} = 4.1\%$$

ℓ = 10,500 ft

CN = 70 for good condition woods of soil group C

$$S = \frac{1{,}000}{70} - 10 = 4.3$$

$$T_c = \frac{L}{0.6} = \frac{10{,}500^{0.8}\,(5.3)^{1.67}}{9{,}000\,(4.1)^{0.5}\,(0.6)} = 2.44\text{ hrs.}$$

* Bureau of Reclamation, Design of Small Dams, figure 30

Anderson-Nichols & Company, Inc.

Subject: Mine Hill

Sheet No. 2 of 13
Date 6/15/81
Computed TCG
Checked CRP

JOB NO.

SQUARES 1/4 IN. SCALE

③ Weston or SCS T.R. # 55

<u>overland:</u>

slope = 5.6%; length = 3,000 feet

from TR 55 graph, V = 0.6 fps

$$\frac{3{,}000}{0.6} = 5{,}000 \text{ sec} = 1.39 \text{ hr.}$$

<u>channel:</u>

say a 1'x10' rectangle, use Manning's formula

$$A = 10 \text{ ft}^2 \qquad R = \frac{A}{10+1+1} = 0.83 \text{ ft}$$

use n = 0.035

$$V = \frac{1.49}{0.035} (0.83)^{2/3} (.041)^{1/2} = 7.6 \text{ fps}$$

$$\text{Time} = \frac{7{,}500}{7.6} = 987 \text{ sec} = 0.27 \text{ hr.}$$

<u>Total</u> = 1.39 + 0.27 = 1.66 hr.

④ Kerby

<u>overland</u>

$$T_c = 0.83 \left(\frac{N \ell}{\sqrt{s}} \right)^{0.467}$$

N for Timber = 0.7, s = 0.056 ℓ = 3,000 ft

$$T_c = 0.83 \left(\frac{0.7(3000)}{\sqrt{0.056}} \right)^{0.467} = 58 \text{ min} = 0.97 \text{ hr.}$$

<u>channel</u>

use Mannings formula, same as Method 3 → 0.27 hr.

<u>Total</u> = 0.97 + 0.27 = 1.24 hr.

Anderson-Nichols & Company, Inc.

Subject [illegible]

Sheet No. 3 of 13
Date 6/15/81
Computed TCG
Checked CRP

JOB NO.

SQUARES 1/4 IN. SCALE

Average T_c from four methods = $\dfrac{1.11 + 2.44 + 1.66 + 1.24}{4}$ = 1.61 hr.

T_{Lag} = 0.6 (1.61) = 0.97 hr.

Stage-Discharge Curve

Assume: ① 10" pipe closed
② higher 8" pipe closed
③ stoplogs in place
④ E = feet above NGVD = h + 800.7 (see p. 5)

From the hydraulic profile on page 5:

Q_{pipe} = $CA\sqrt{2g}\sqrt{H}$ since the pipe is submerged.

C = orifice coefficient = 0.61
A = Area = $\pi r^2 = \pi(1/3)^2 = 0.35\ ft^2$
$2g = 64.4$
H = head above middle of orifice = E - 801.03

$$Q_{pipe} = 0.61(0.35)(\sqrt{64.4})(\sqrt{E-801.03}) = 1.71\sqrt{E-801.03}$$

$Q_{spillway}$ = flow over 5 foot weir to left + flow over 12 foot stop log weir + flow over 10.5 foot weir to right

$$= C_{w_1}(5)(H_{w_1})^{3/2} + C_{SL}(12)(H_{SL})^{3/2} + C_{w_2}(10.5)(H_{w_2})^{3/2}$$

$C_{w_1} = 2.8$ $H_{w_1} = E - 801.5$
$C_{SL} = 3.1$ $H_{SL} = E - 801.0$
$C_{w_2} = 2.7$ $H_{w_2} = E - 801.9$

$$Q_{spillway} = 2.8(5)(E-801.5)^{3/2} + 3.1(12)(E-801.0)^{3/2} + 2.7(10.5)(E-801.9)^{3/2}$$

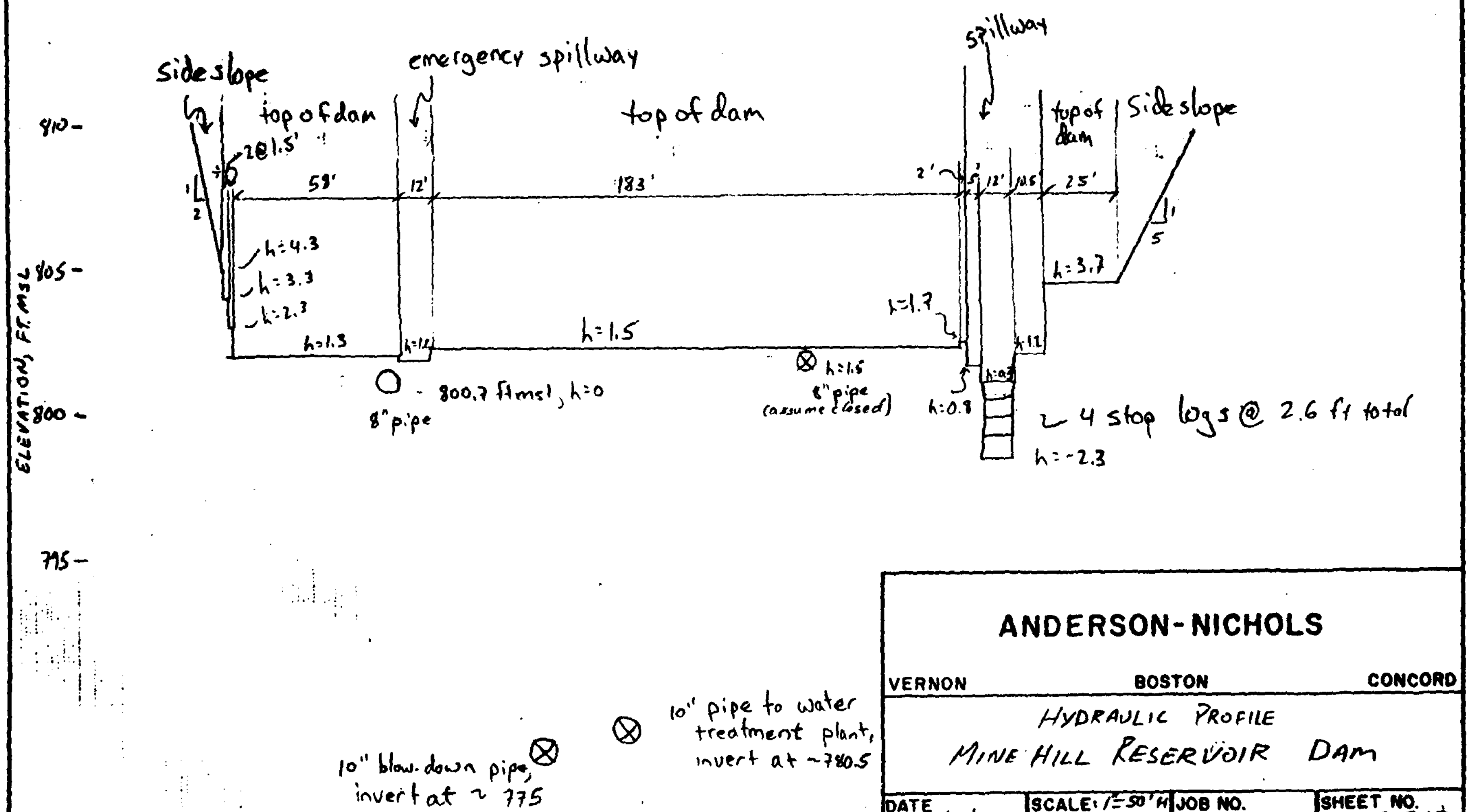
$Q_{top\ of\ dam}$; C = 2.7 for all top of dam weirs. H varies with top elevation of weir.

$$Q_{top\ of\ dam} = 2.7(1)(E-804.0)^{3/2} + 2.7(1)(E-803.0)^{3/2} + 2.7(58)(E-802.0)^{3/2} + 2.7(183)(E-802.2)^{3/2} + 2.7(2)(E-802.3)^{3/2} + 2.7(25)(E-804.4)^{3/2}$$

$$Q_{em.\ spillway} = 2.7(12)(E-801.9)^{3/2}$$

$Q_{side\ slopes}$: C = 2.5, Q = C (Length) (avg. depth)$^{3/2}$

$$Q_{side\ slopes} = 2.5(5(E-804.4))(0.5(E-804.4))^{3/2} + 2.5(2(E-805.0))(0.5(E-805.0))^{3/2}$$



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HYDRAULIC PROFILE
MINE HILL RESERVOIR DAM

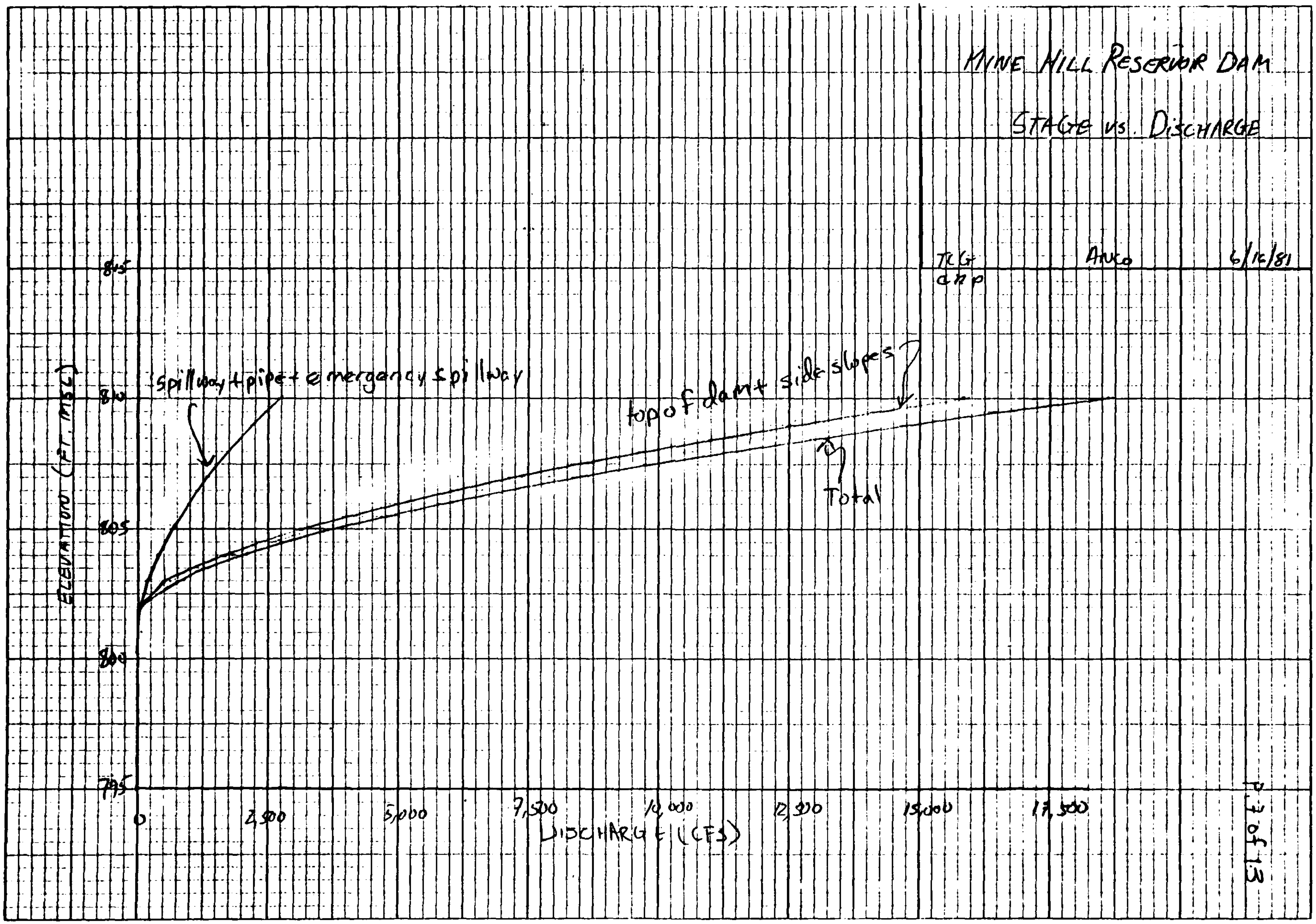
DATE	SCALE	JOB NO.	SHEET NO.
6/16/81	1"=50' H 1"=5' V		P. 5 of 13

Stage vs. Discharge

elevation (ft. msl)	h (feet)	Qpipe (cfs)	Qspillway (cfs)	Qtop of dam (cfs)	Qe.s. (cfs)	Qside slope (cfs)	QTotal (cfs)
775	-25.7	0	0	0	0	0	0
800.7	0	0	0	0	0	0	0
801.9	1.2	2	35	0	0	0	37
802	1.3	2	43	0	1	0	46
803	2.3	2	163	512	37	0	715
804	3.3	3	335	1,650	99	0	2,087
805	4.3	3	544	3,193	177	1	3,918
807	6.3	4	1,054	7,317	373	50	8,798
810	9.3	5	2,005	15,404	747	427	18,588

spillway + pipe + em. s/w

el.	Q
775	0
800.7	0
801.9	37
802	46
803	202
804	437
805	724
807	1,431
810	2,757


MINE HILL RESERVOIR DAM
STAGE vs. DISCHARGE
TKG chp
ANCO
6/16/81
P. 7 of 13
spillway + pipe + emergency spillway
top of dam + side slopes
Total
815
810
805
800
795
0
2,500
5,000
7,500
10,000
12,500
15,000
17,500
DISCHARGE (CFS)
ELEVATION (FT. MSL)

Stage-Storage Determination

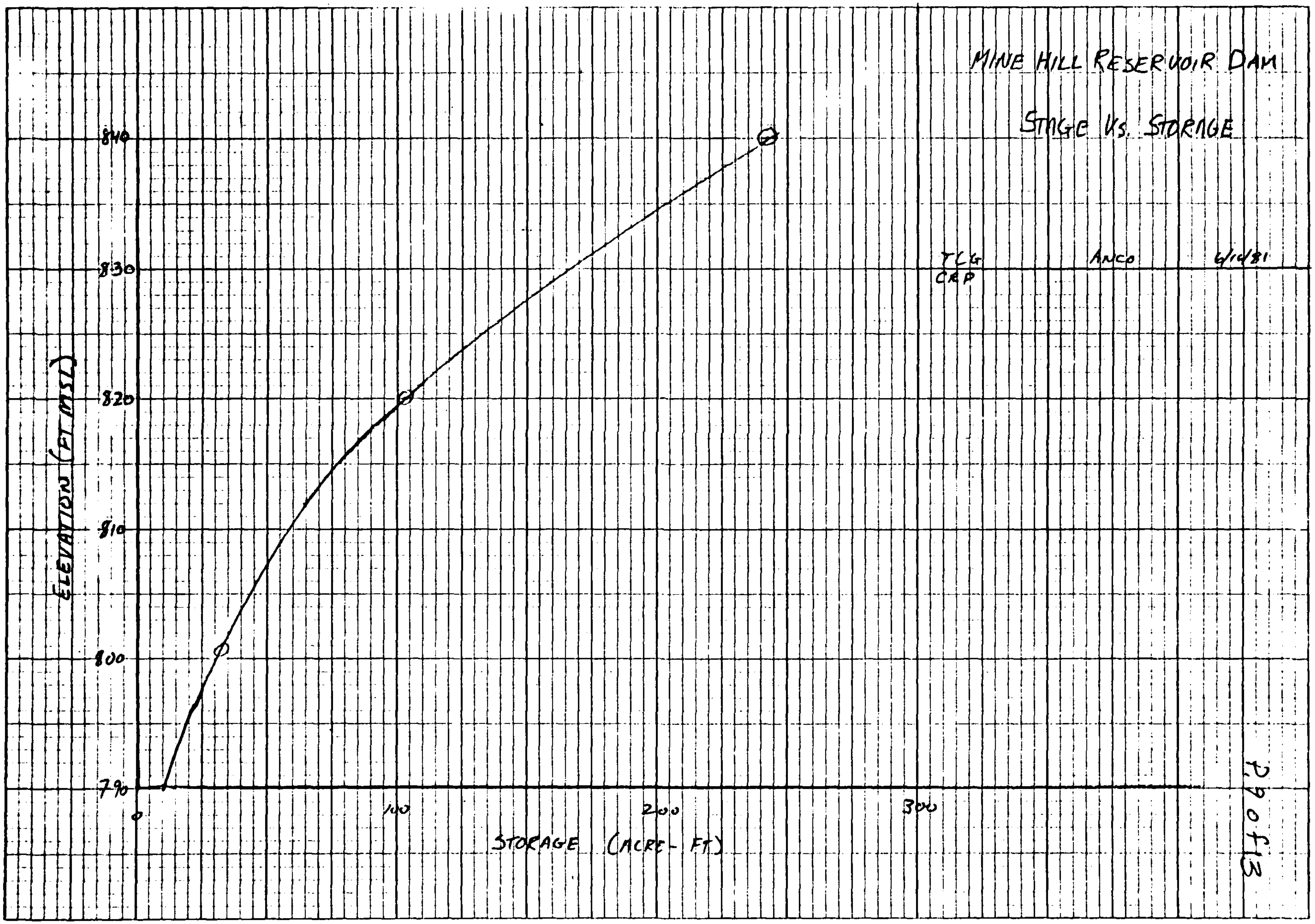
Storage with pond full, 800.7 ft msl, = 10,400,000 gal = 31.9 ac-ft

ELEVATION (ft, msl)	SURFACE AREA (acres)	AVG. S.A. (acres)	INCREMENTAL STORAGE (acre-feet)	CUMULATIVE STORAGE (acre-feet)
		-	-	
800.7	2.9			31.9
		3.7	71.4	
820	4.5			103.3
		6.95	139	
840	9.4			242.3

INPUT for HEC-1 (from curve)

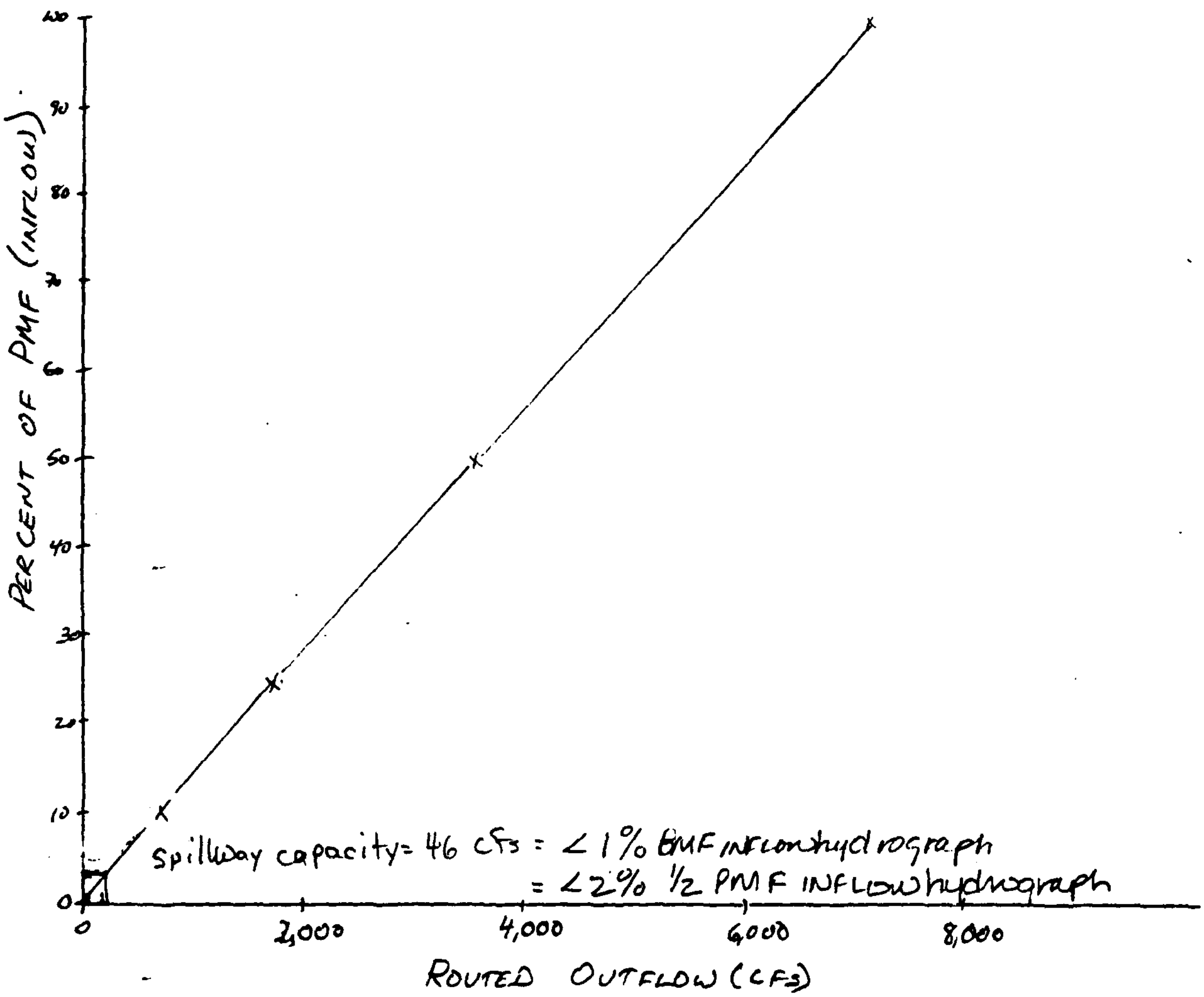
STAGE	STORAGE
775	0
800.7	31.9
801.9	35
802	35.3
803	38.2
804	41.1
805	44
807	50
810	58.5

KE 10 X 10 TO THE INCH • 7 X 10 INCHES KEUFFEL & ESSER CO. MADE IN U.S.A. 46 0782



OVERTOPPING ANALYSIS

FROM HEC-1 output.



DRAWDOWN CALCULATIONS

C for the pipes

D = diameter = 10"
n = 0.015 from King's Handbook of Hydraulics
A_p = area = $\pi(5/12)^2 = 0.545 \text{ ft}^2$
L_p = length ≈ 50 ft
k_f = friction loss through pipe
k_L = entrance loss to pipe = 0.8
C_p = coefficient of discharge (incorporating A_p & 2g)
C = coefficient of discharge

$$K_f = \frac{5087\, n^2}{D^{4/3}} = \frac{5087\,(.015)^2}{10^{4/3}} = 0.0531$$

$$C_p = 0.545\sqrt{\frac{2g}{1+k_L+k_f L_p}} = 0.545\sqrt{\frac{64.4}{1+0.8+0.0531(50)}} = 2.07$$

$$C = \frac{C_p}{A\sqrt{2g}} = \frac{2.07}{(0.545)(\sqrt{64.4})} = 0.47$$

for drawdown calculations

1. no significant inflow
2. two 10" pipes operable - 1 to water treatment plant
   1 (lower) for blow-down
3. The 10" pipe to the plant - say maximum at plant capacity of 1mgd 1.55 cfs. Midpoint of pipe at 780.9
4. The other lets water out at its full capacity. $Q_p = C_p H^{1/2}$. Midpoint at 775.4
5. Ac-ft/day = 1.98 · Q_{AVG}
6. Days = Δ Storage/(Ac-ft/day)
7. Storage = 0 at 775, 31.9 at 800.7.. Say 780 = 2; 785 = 6; 790 = 12
   795 = 20

Anderson-Nichols & Company, Inc.

Subject MINE HILL

Sheet No. 12 of 13
Date 6/17/81
Computed TCG
Checked CGD

JOB NO.

Elev.-Ft above NGVD	Storage Ac-Ft	ΔS Ac-Ft	H (plant pipe) Feet	Q (plant pipe) cfs	H (blow off pipe) cfs	Q (blow off) cfs	Q_{TOTAL} CFS	Q_{AVG} CFS	Ac-Ft PER DAY	DAYS
800.7	31.9		19.2	1.55	25.3	10.41	11.96			
		11.9						11.335	22.5	0.53
795	20		14.1	1.55	19.6	9.16	10.71			
		8						10.085	20.0	0.40
790	12		9.1	1.55	14.6	7.91	9.46			
		6						8.71	17.3	0.35
785	6		4.1	1.55	9.6	6.41	7.96			
		4						6.20	12.3	0.33
780	2		–	–	4.6	4.44	4.44			
		2						2.22	4.4	0.45
775	0		–	–	–	0	0			

$\Sigma = 2.06$ days

Anderson-Nichols & Company, Inc.

Subject: Nine Hill

Sheet No. 13 of 13
Date 6/17/81
Computed TCG
Checked CFP

JOB NO.

SQUARES 1/4 IN. SCALE

Capacity with Stop logs Removed

$$Q_{spillway} = 2.8\,(5)\,(H_w)^{3/2} + 2.8\,(12)\,(H_{spill})^{3/2} + 2.7\,(10.5)\,(H_{w_2})^{3/2}$$

H_w = head above $h = 0.8$ H_{spill} = head above $h = -2.3$

H_{w_2} = head above $h = 1.2$

at 802.0 ft msl, $h = 1.3$, $H_w = 0.5$; $H_{spill} = 3.6$, $H_{w_2} = 0.1$

$$Q_{spillway} = 2.8(5)(0.5)^{3/2} + 2.8(12)(3.6)^{3/2} + 2.7(10.5)(0.1)^{3/2} = 235\text{cfs}$$

$$Q_{Total} = Q_{pipe} + Q_{e.s} + Q_{spillway}$$

$$= 2^{*} + 1 + 235 = 238\text{ cfs}$$

* see p. 6 of these calcs.

APPENDIX 4

ENGINEERING DATA

MINE HILL RESERVOIR DAM

Mine Hill Res

AS PER YOUR REQUEST

SEWER — HACKETTSTOWN MUNICIPAL UTILITIES AUTHORITY — H.M.U.A. — WATER

JOSEPH J. RICHARDS
Executive Director

ADMINISTRATION BUILDING
424 HURLEY DRIVE
HACKETTSTOWN, N. J. 07840
(201) 852-3622

NO REPLY IS NECESSARY

ELSON T. KILLAM ASSOCIATES, INC.
Hydraulic and Sanitary Engineers · 48 ESSEX STREET, MILLBURN, NEW JERSEY 07041
(201) 379-3400

ELSON T. KILLAM (1900-1968)
PETER HOMACK
ROBERT C. MOORE
JOSEPH P. FOLEY
GIFFORD R. BOYCE
FRANK A. FILIPPONE
OTTO MILGRAM

October 23, 1969

Mr. Robert L. Hardman, P. E.
Chief, Bureau of Water Control
State of New Jersey
Department of Conservation and Economic Development
P. O. Box 1390
Trenton, New Jersey 08625

Reference: Dam Application No. 356
Lower Mine Hill Distributing Reservoir

Dear Mr. Hardman:

In your letter of June 4, 1969, addressed to the Hackettstown Municipal Utilities Authority, it was reported that your records indicated that the original permit for the construction of Lower Mine Hill Distributing Reservoir was declared null and void by the Division on November 5, 1942. It was requested that as-built drawings and other engineering data explanatory of the design and construction methods used be submitted since the dam apparently was constructed without prior approval by the Division.

The Authority has reviewed their files and find no as-built drawings of this dam but there is correspondence and information in the files indicating that this reservoir was constructed in 1897. A copy of a letter dated May 12, 1961 from the Hackettstown Board of Water Commissioners to Mr. John Wyack, Secretary of the Water Policy and Supply Council, states that the Mine Hill Reservoir was built in 1897 under a grant by the Legislature of 1869 - Page 1090 - Paragraph 4.

In other correspondence, we find reference to a charter granted to the Hackettstown Aqueduct Company, under Laws of 1853, Page 369, and also reference to enabling acts by which the private plant (Hackettstown Aqueduct Company) was taken over by the Town of Hackettstown. Once again the Laws 1869, Page 1090 are mentioned.

Further, the approved drawings dated 1933 and 1934 for Hackettstown Storage Reservoir - Dam Application No. 218 show the Lower Mine Hill Reservoir to be an existing reservoir.

In view of the apparent year of construction (1897), we wonder if this is the reason that there is no approval in your files for the construction of this reservoir.

In addition, the Authority's file contains a print dated July 31, 1940, showing proposed repairs to Lower Mine Hill Reservoir, said repairs consisting of a solid reinforced concrete facing to be installed on the upstream facing of the existing rubble masonry dam. These repairs were never made and we wonder if the permit declared null and void on November 5, 1942 were to cover the proposed repairs indicated on this print dated July 31, 1940.

In view of the apparent date of construction of this reservoir, and the fact that no record plans of the construction are in the Authority's file, we would appreciate your advice on whether any additional information is required beyond the Annual Report dated May 27, 1969, which was recently submitted.

Very truly yours,

ELSON T. KILLAM ASSOCIATES, INC.

Gifford R. Boyce

GRB/jh
cc: Hackettstown Mun. Utilities Authority

STATE N.J.
WATER POLICY - GEN.

Annual Report - Dams

Application No. 218 For Year: 1969

Name of Dam: Lower Mine Hill Dam Date of Inspection: 5/16/69

Owner, Name: Hackettstown Municipal Utilities Authority

Address: 424 Hurley Drive; Hackettstown, New Jersey 07840

Description of condition of the following:

1. Embankment (Erosion, seepage, etc.)
   The dam is of rock masonry construction built into the side hills. There is no sign of erosion and only slight seepage through the dam itself. In 1964 upstream face was grouted after repairs were made to the rock masonry.
2. Spillway (Concrete spalling, timber rotting, leakage, etc.)
   Good Condition
3. Emergency Spillway (Erosion, growth of sod, riprap, etc.)
   Perfect Condition
4. Outlet Works (Operational condition of valves or grates, condition of pipe, etc.)
   Gate valve on outlet pipe and gate valve on blow off in good operating condition.
5. Inlet streams (Silt deposition, etc.)
   Good condition - No silting
6. Outlet stream (Scouring, undercutting of dam, condition of stilling basin, etc.)
   No scour or undercutting of dam - stilling basin in good condition.
7. General
   a. Did flood waters overtop dam during period of report? No
      If so, at what stage and date thereof.
   b. Report on any other condition not covered above.
      Dam and appurtenant works appear in good condition.
   c. In your opinion, does existing condition warrant repairs?
      If so, where and to what extent.
      In my opinion the existing condition does not warrant repairs. There is slight seepage through the rock masonry but this is not considered serious. All other aspects are in good condition.

d. Photographs of the upstream and downstream faces of the embankment, main spillway and emergency spillway noting date taken.

Use additional sheets when necessary.

Inspected by Elson T. Killam Associates, Inc.

Gifford R. Boyce

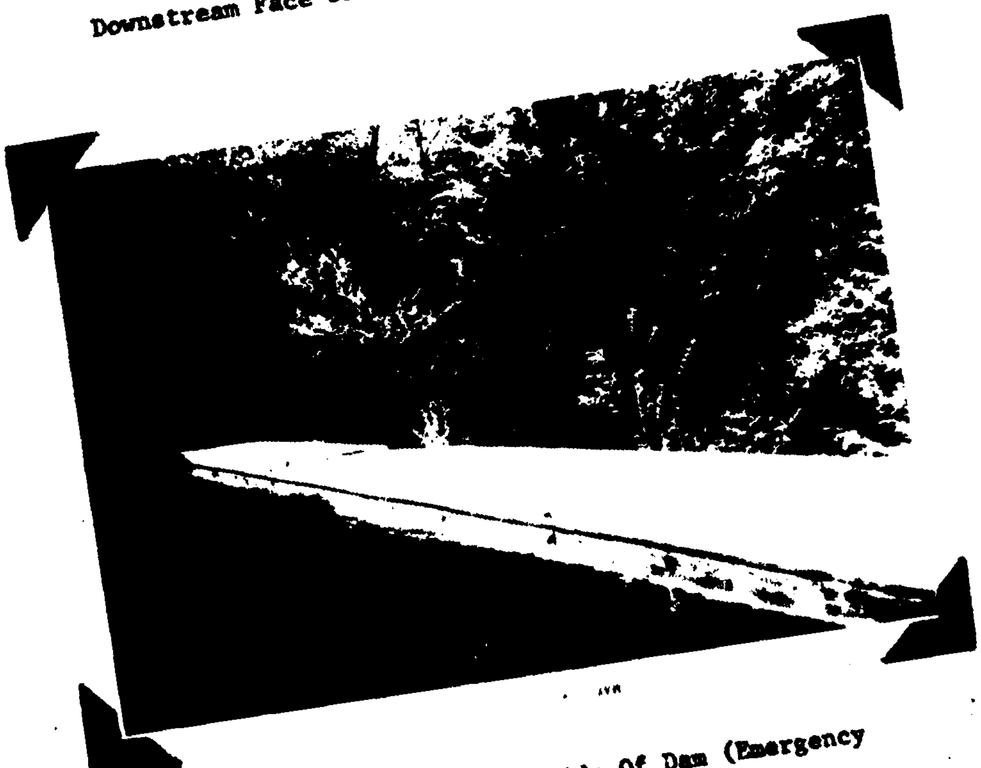
Gifford R. Boyce
Consulting Engineer
N.J. License No. 8476

Date: May 27, 1969

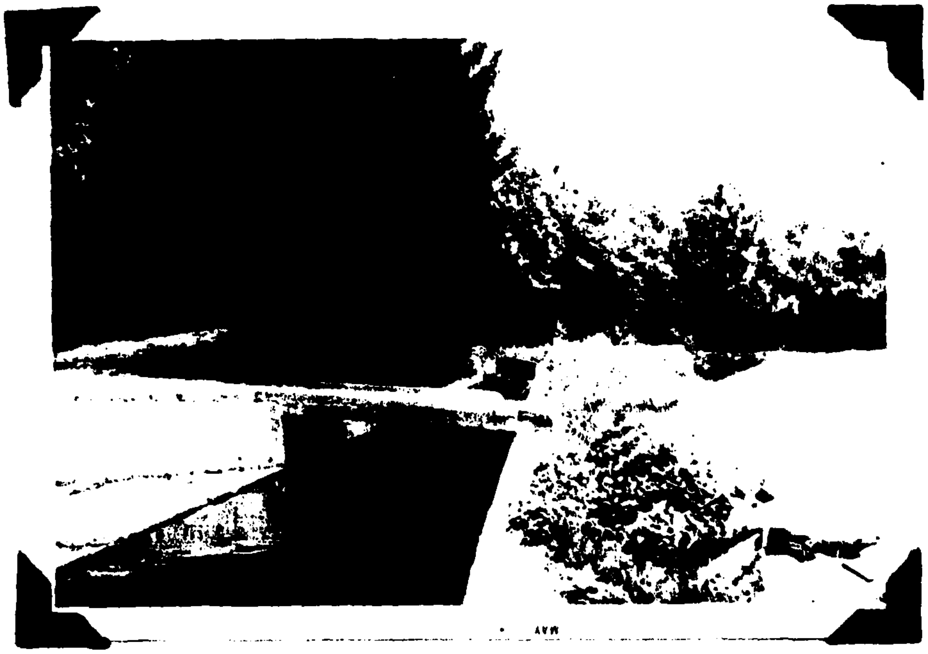
Downstream face of center dam (Emergency spillway at top of picture). 5/16/69

Downstream face of south side of dam. 5/16/69

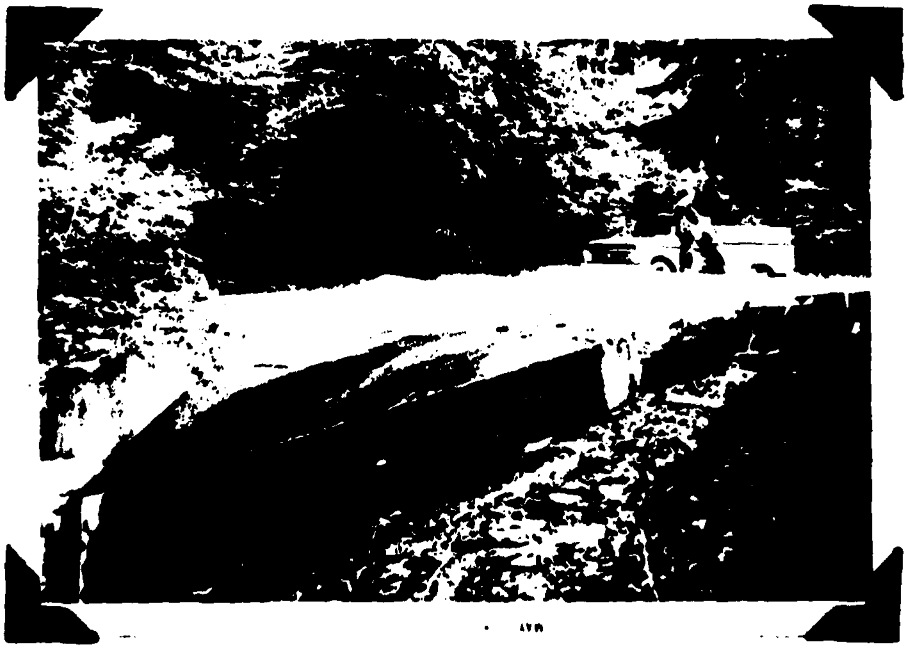
Downstream Face Of North Side Of Dam 5/16/69



Upstream Face Of South Side Of Dam (Emergency Spillway At Left Of Center) 5/16/69



Looking Upstream Along Inlet Flume (Reservoir At Right) 5/16/69



Looking Upstream At Main Spillway 5/16/69

REPORT
Upon
INSPECTION AND RECOMMENDATIONS
For
REPAIR OF LOWER MINE HILL RESERVOIR DAM

HACKETTSTOWN, NEW JERSEY

June 29, 1964

ELSON T. KILLAM ASSOCIATES, INC.
Hydraulic and Sanitary Engineers
Millburn, New Jersey

ELSON T. KILLAM ASSOCIATES, INC.
HYDRAULIC & SANITARY ENGINEERS
48 ESSEX STREET, MILLBURN, NEW JERSEY
DREXEL 9-3400

ELSON T. KILLAM
PETER HOMACK
ROBERT D. MOORE
JOSEPH P. FOLEY
GIFFORD R. BOYCE

June 29, 1964

Board of Water Commissioners
of the Town of Hackettstown
315 Washington Street
Hackettstown, New Jersey 07840

Subject: Inspection and Recommendations for Repair of Lower Mine Hill Reservoir Dam

Gentlemen:

This report is submitted to recap the events, inspections, and repair work connected with the resurfacing of the upstream face of the Lower Mine Hill Reservoir dam.

Repairs to the dam were felt necessary by the Board because of the observed leakage, particularly in the wintertime, of water through the dam structure. A contract was let by the Board to the McColl Gunite and Grouting Company to prepare the upstream surface of the dam by cleaning and raking out any cracks or poor joints and applying 2 inches of gunite over a steel mesh to the upstream face.

The existing surface course, consisting of a thin plastered or gunited covering, appeared from a visual observation in fairly sound condition, except for cracks along its surface, and it was anticipated that the above-mentioned repairs would adequately seal the upstream face from any further leakage.

The reservoir was drained on June 8, 1964, and after the contractor started the cleaning and preparatory work, the surface course, believed to be added to the dam in 1943-1944, was found to be loose and without proper adhesion to the dam proper. Upon removing this surface course, the contractor found the original mortar joints between the blocks of stone to be in very poor condition. Work was started at the top of the dam, and approximately one-quarter of the upstream surface was exposed when the contractor notified the Board of the conditions found and asked the Board for a re-evaluation of the scope or extent of repairs felt necessary. The contractor felt that because of actual conditions found, the possible extent of repairs might exceed the original intent or scope of his contract. At this time, June 11, 1964, the Board, through Mr. Lester E. Kelley, requested an inspection of the dam to be made to evaluate the conditions found, and to make whatever recommendations were necessary concerning the scope of repair work required to place the dam in a sound, watertight condition.

On Friday, June 12, 1964, Mr. Bartholomew of our office made a visual inspection of the dam proper, accompanied by Mr. G. Powers of the Board, and reviewed with the contractor work done to date.

The surface course of the upper half of the upstream face had been cleaned and the joints raked out at this time. The contractor reported that up to that time all of the surface course was

removed readily and many of the stone joints were in such condition that removal of the original mortar was easily accomplished by hand tools as deep as 3 to 4 feet.

It was felt by all parties that more extensive repairs were necessary than originally contemplated and it was our recommendation that a structural consultant be retained to review the structural condition of the dam and make their recommendations concerning necessary repairs.

With approval of the Board, the firm of Woodward-Clyde-Sherard and Associates was engaged, and a visit to the site was made on June 16, 1964, by Mr. David Greer, a principal of the above-mentioned firm, Mr. Frank Filippone, a structural engineer with our firm, Mr. Bartholomew, Mr. McColl, the contractor doing the repair work, and Mr. G. Powers of the Board.

By this date, repairs had exposed most of the upstream face, and it was found that the lower half of the dam face was in much sounder condition than the upper half.

A visual inspection of the downstream face and the base of the dam revealed no visual unsound structural conditions. Mr. Greer's report is included as an appendix to this report and reviews in more detail the findings of those present at the site visit.

Additional recommended repairs and maintenance procedures not mentioned in Mr. Greer's report include the following:

(1) Carry 3-inch gunite face to top of dam slab surface and provide a water seal between the two surfaces with a 1" x 1" waterproof material such as Igas.

(2) Chip out and clean any surface cracks in the concrete top slabs of the dam and caulk with a waterproof seal.

(3) Wrap the intake silo with silo tie rods at the water surface where the brick work is loose and apply steel mesh and 2 inches of gunite to the entire outer surface.

(4) Maintenance procedures should include varying the water surface in the wintertime so as to prevent large thick ice formations and make prodigious use of wood beams to take up the expansion of whatever ice does form.

(5) Concerning leakage under the dam as mentioned in paragraph 10, page 4, of Mr. Greer's report, it is our opinion that any substantial leakage under the dam would be a major concern of the structural stability of the dam proper and observations should be continually made for this condition. Since no leakage under the dam has been observed by the Board members or operating personnel to date and no apparent leakage or evidence of this type leakage was observed during our inspections, it was felt that the extreme expense of grouting or sealing the surrounding ground and dam base below ground level (estimated at several times the cost of the present repairs) was not warranted at this time. Also, the expense of such work would be the same at any later date except for the necessity of draining the reservoir.

The recommendations set forth in Mr. Greer's report and those mentioned in our report were conveyed verbally to the Board through Mr. Kelley on the night of June 16, 1964.

In summation, it is felt that although the repair work recommended will substantially increase the cost originally contemplated by the Board for repairs to the dam, this work is felt required as a minimum in order to insure a substantial reduction in leakage. This report or any verbal reports to date by Mr. Greer or members of this firm are not meant to imply that the dam proper is structurally sound and stable as extensive testing and investigation would be necessary to determine this fact. However, from all visual observations and from the fact that the dam has been standing since its construction, believed to be in 1895, without any visual sign of movement, there is no reason to believe that the dam is unstable or subject to any serious movement. With the completion of the recommended repairs and the careful control of ice formations, the dam should be serviceable for many years and well worth the moneys spent for its upkeep and repair. It is felt that the dam is valuable and necessary to the water facilities, certainly worth keeping in good repair, and the Board is to be commended for taking this remedial action before more serious deterioration or damage develops.

Very truly yours,

ELSON T. KILLAM ASSOCIATES, INC.

P. Homack

MEB:bw

Peter Homack

APPENDIX

OAKLAND, CALIFORNIA
SAN DIEGO, CALIFORNIA

DENVER, COLORADO
KANSAS CITY, MISSOURI
PHILADELPHIA, PENNSYLVANIA

OMAHA, NEBRASKA
NEW YORK, NEW YORK

WOODWARD-CLYDE-SHERARD AND ASSOCIATES
SOIL AND FOUNDATION ENGINEERING
1425 BROAD STREET
CLIFTON, NEW JERSEY
TELEPHONE 471-2000

PRINCIPALS
JAMES L. SHERARD
DOUGLAS E. MOORHOUSE
DAVID M. GREER

ASSOCIATE
ROY E. HUNT

June 26, 1964
64-155

Elson T. Killam Associates, Inc.
48 Essex Street
Millburn, New Jersey

Attention: Mr. Mel. E. Bartholomew

Inspection of Masonry Dam
Hackettstown Water Board

Gentlemen:

On Monday June 15 I was asked by Mr. Bartholomew of Elson T. Killam Associates, to examine a leaky masonry dam belonging to the Hackettstown, N.J. Water Board, which was then undergoing repairs by the McColl Gunite and Grouting Company, Inc. My commission, as stated to me by Mr. Bartholomew, was to examine the condition of the structure and the reservoir, to review the plans for repairs, to discuss with representatives of Elson T. Killam Associates any changes in or additions to the plans which might be suggested by my observations or which might be proposed at the time of the inspection; and to present in writing my opinion with respect to the plans and my recommendations for changes or additions thereto. This report records my observations, opinions, and recommendations.

The dam, which is about 25 feet in height, is constructed of large, very roughly shaped blocks of stone (apparently mostly granitic gneiss). The stone is laid roughly in courses and was probably set in lime-sand mortar. Construction date was reported to me as "about 1895". Repairs to the upstream and downstream faces were made in 1943 - 1944 (as shown by dates scribed in the mortar), the repairs consisting mostly of replacement of missing or softened mortar by new portland cement mortar.

At the time of my inspection, workmen were chipping out the unsound mortar on the upstream face. Most of the remaining exposed portland cement mortar (presumed to be from the 1943-44 repairs) was hard and sound; but there were some soft spots remaining; there were many areas where this mortar was missing entirely, and an older mortar (presumably the original construction) was exposed; there were several areas where this older mortar was missing, so that a steel rule could be thrust into the space between the stones to distances which were reported to be as much as 4 feet (or between 1/3 and 1/2 the thickness of the dam at that point). In addition, there were numerous small holes through areas of sound portland cement mortar, evidently opening into mortarless spaces within the body of the dam.

The older mortar which was exposed was yellow in color, had the texture of a clayey or silty medium sand, and could be cut easily with a pen-knife in most places, and dug out with the fingers in many places.

The dam was reported to have been leaking badly, with several areas of concentrated flow from the downstream face. Although some specific flows were reported in the lower part, there was no report of under-seepage, or of water emerging from the stream bed downstream. It was stated that leakage in the upper part of the dam was especially conspicuous after ice had started to build up on the downstream face in the winter months, and the suggestion was made that the upper courses of stone were temporarily separated (or raised) by expansion of the internal ice lenses as they built up.

Examination of the concrete slab which forms the top surface of the dam showed a few cracks, at a right-angle to the axis of the dam, which were closed at the time of my inspection and which did not suggest that there had been much if any uplift of this slab due to ice action.

At the time of my inspection, the proposed repairs had progressed to the point where most of the unsound mortar exposed on the reservoir face of the dam had been chipped away by means of pneumatic hammers; and it was reported that the next step would be the cleaning of the exposed joints by jetting, preparatory to packing with mortar.

At my request, a test pit was dug by hand, at the base of the upstream face and about the center of the dam. The pit was entirely in a mass of rock chips in a matrix of clayey silt (sediment). Although the soil was saturated, and a trickle of water was flowing in a small surface channel two or three feet from the pit, there was almost no seepage into the pit, indicating that the soil at this point is relatively impervious. The mortar exposed by the pit appeared to be sound.

After some discussion, it was agreed that the Contractor would proceed with the repairs, with the following conditions:

1. Chipping and cleaning would proceed on the reservoir face of the dam as planned.

2. A trench, two to three feet deep, would be dug along the base of this face of the dam; and chipping and cleaning, as well as subsequent joint filling, guniting, etc., would be extended down into this trench.

3. Open pipes, for subsequent grout injection, would be set as far as possible into the open joints, and would be mortared into place. Spacing and size of these grout pipes would be left to the judgment of the Contractor.

4. Joints would be filled with portland cement mortar.

5. The gunite facing on the dam would be 3 inches thick, and would be reinforced by 3/8" bars on 18" centers, both horizontal and vertical.

6. The supporting pins for the reinforcing would be set (using lead) in holes drilled into sound rock, as nearly as practical on 3-foot centers. No pins would be supported in joint mortar, either old or new.

7. After the gunite facing had been completed, neat cement grout would be pumped into the dam through the grout pipes referred to in (3) above. The grouting pressure would be controlled carefully so as not to lift or move the stones comprising the dam; and grout injection would be stopped whenever grout began to emerge from the downstream face of the dam.

8. The trench referred to in (2) above would be backfilled, not with the stony soil that came out of it, but with mud from the reservoir bottom.

9. No pointing or guniting would be done on the downstream face of the dam.

10. As the reservoir is filled, careful observations would be made for possible leaks under the dam or through it below the mud line; and if such leaks should develop, the situation would be reviewed with a view to planning a foundation grouting program to be put into effect on the next occasion when the reservoir could be emptied.

These points represent my recollection of the steps agreed on in discussion between Mr. Bartholomew, Mr. Powers, and myself. I concur in all of them.

It has been a pleasure to be of service to you and the Hackettstown Water Board.

Very truly yours,

David M. Greer

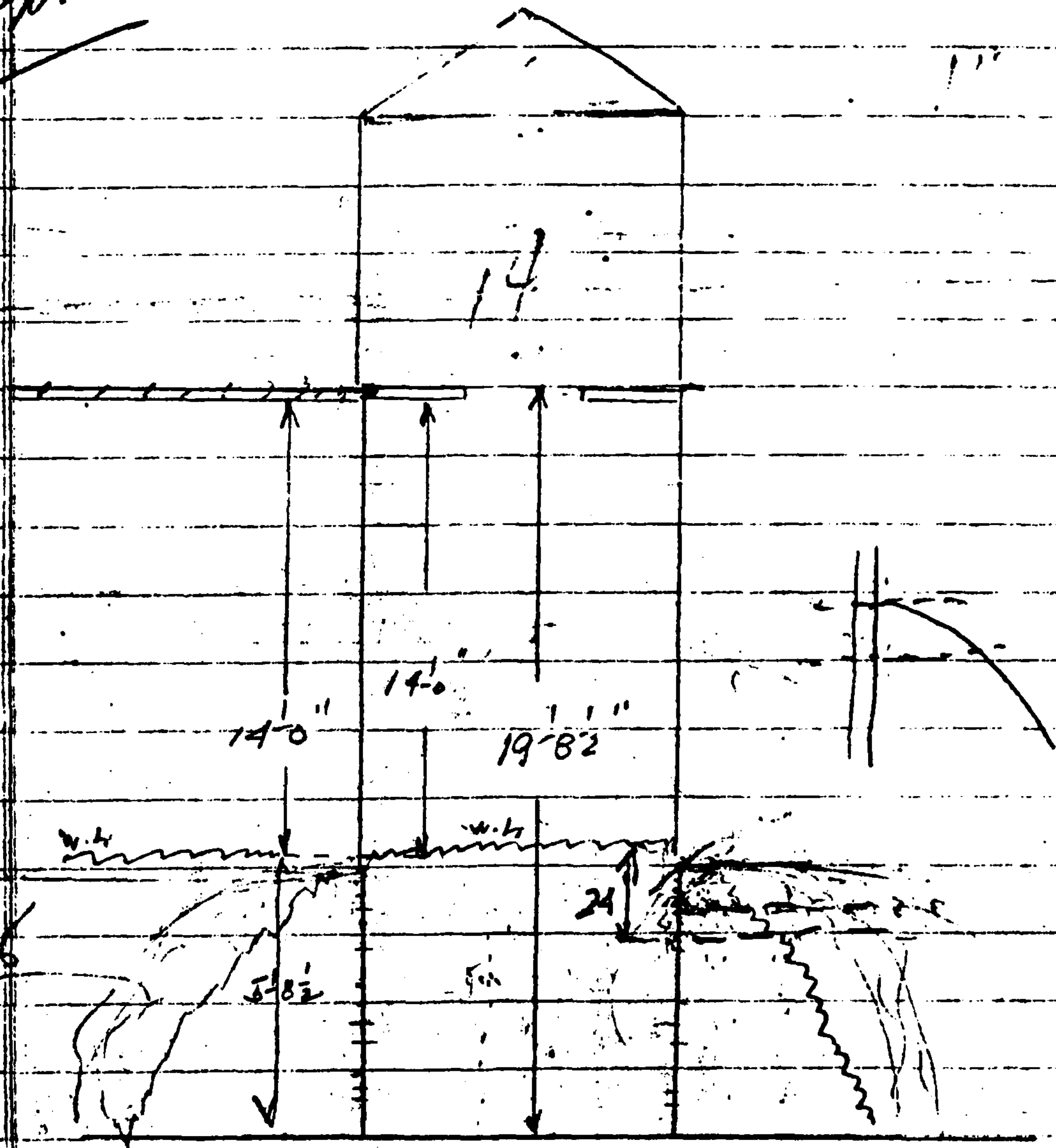
David M. Greer, P.E.

DMG:esch

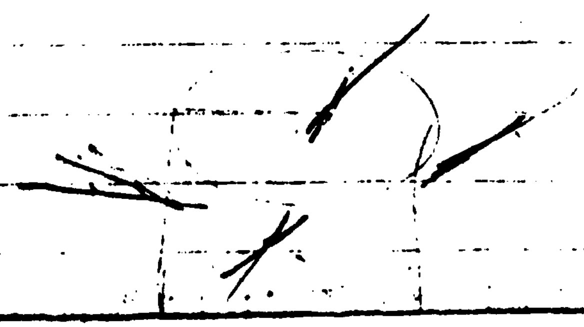
Submitted: 5 copies

"Irene Rice" 10-19-63

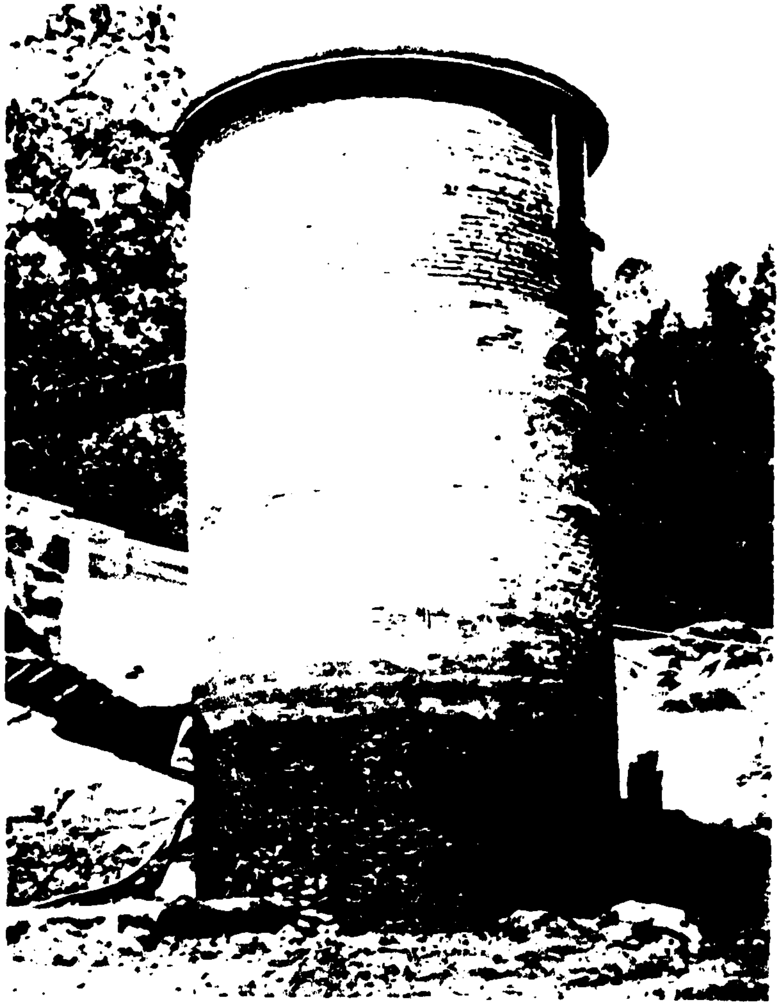
Report

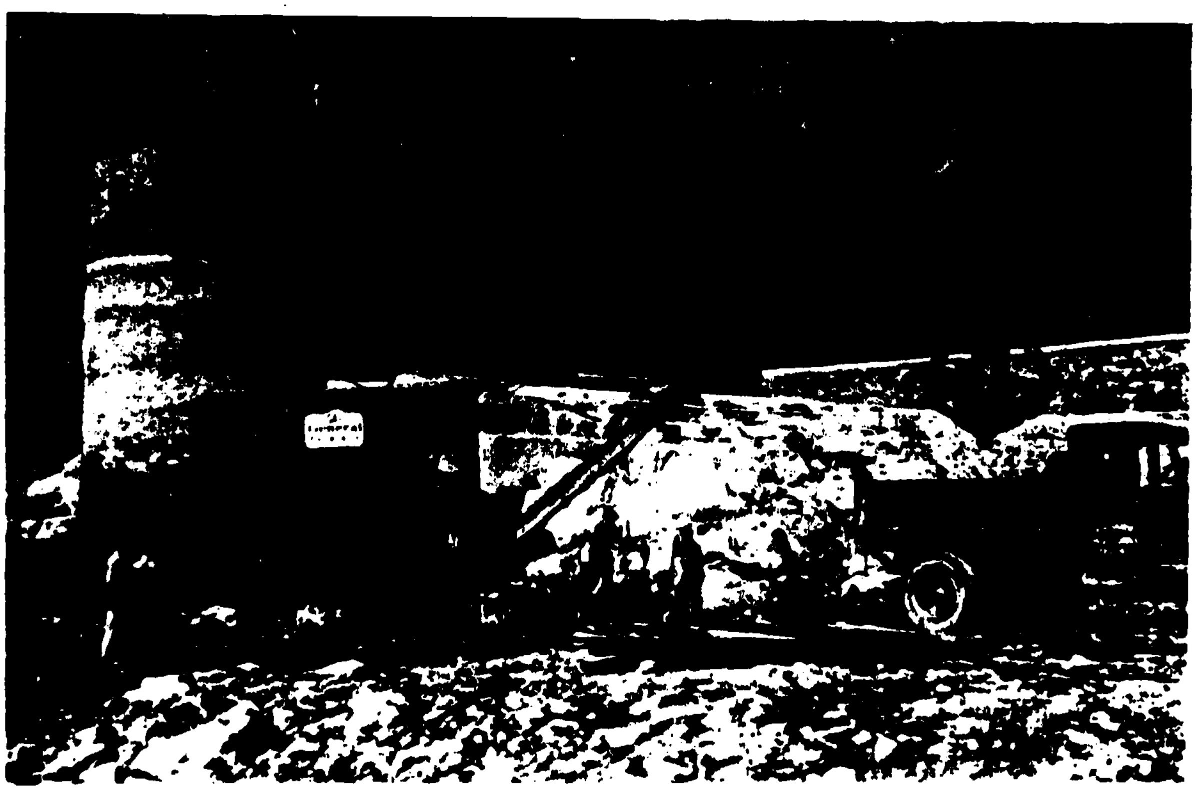


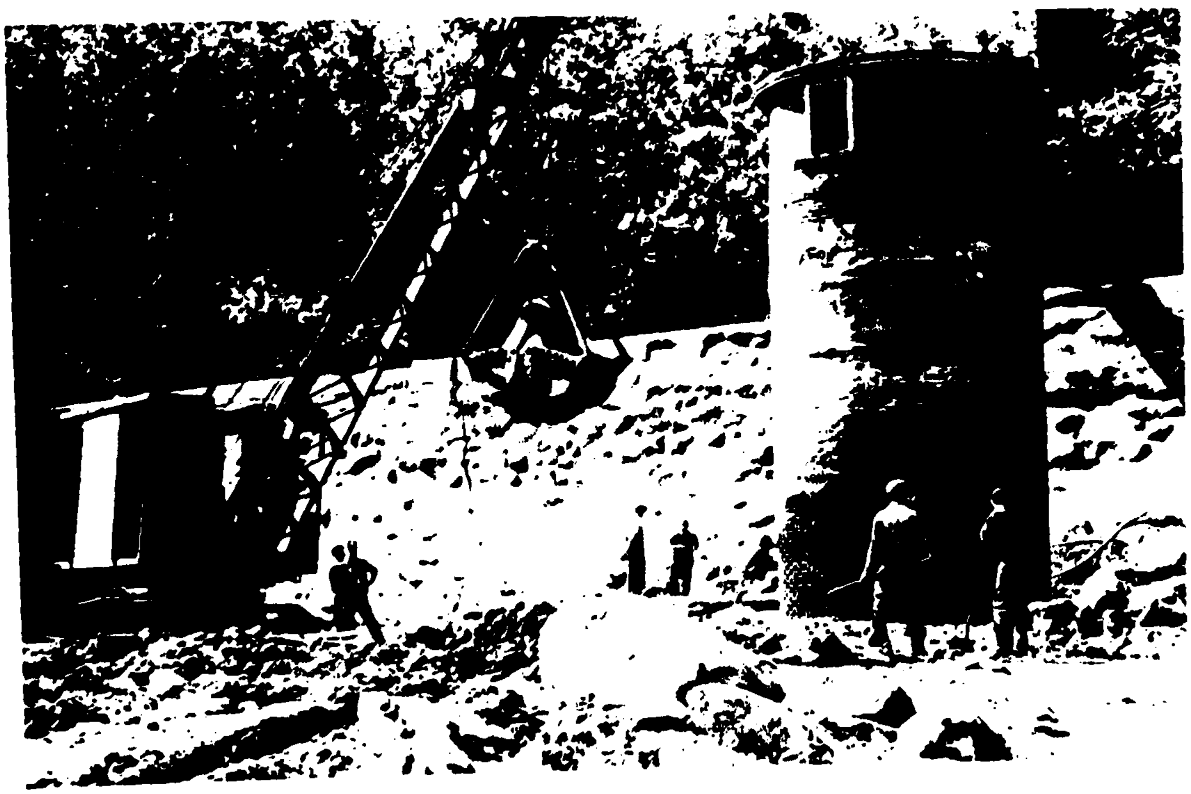
Rock Rubble

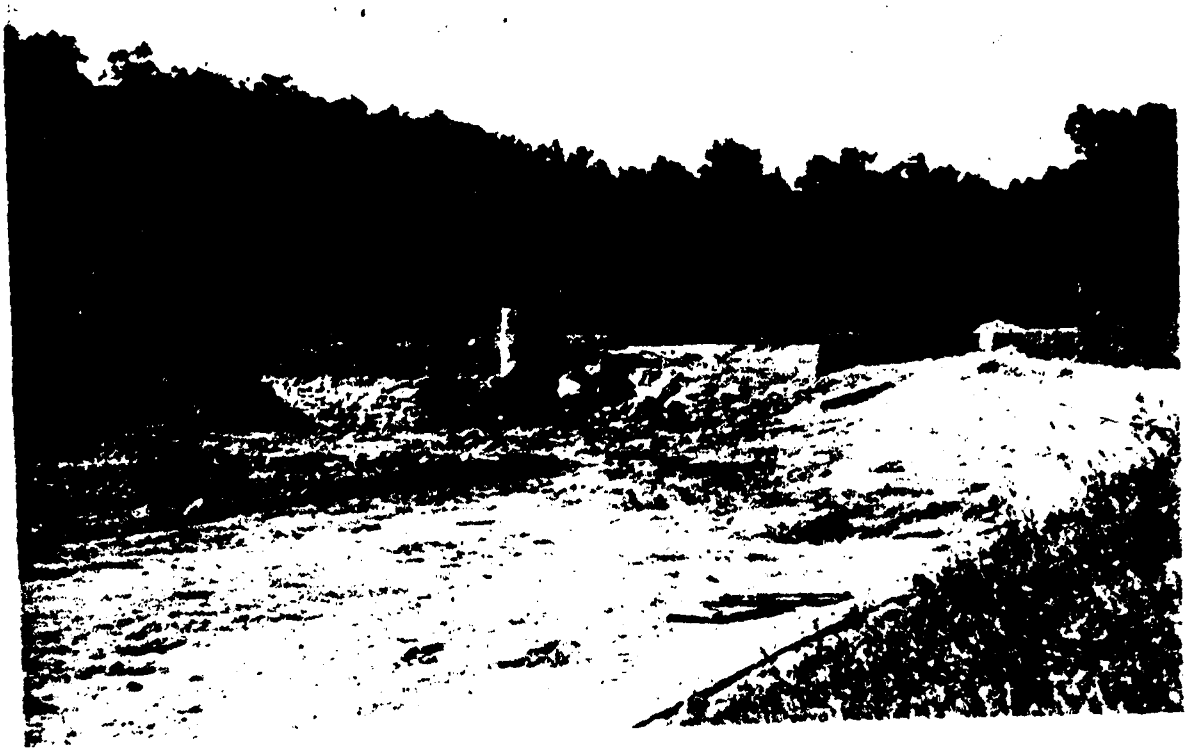


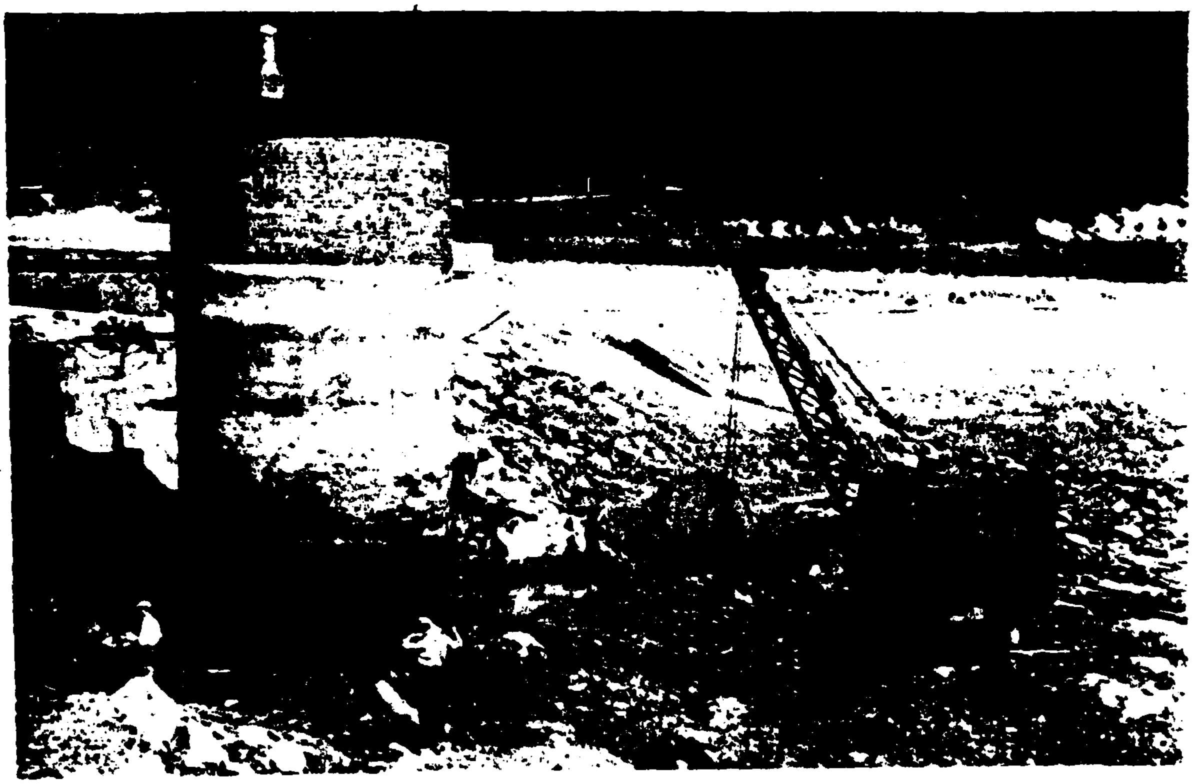
4- 8" Stoke

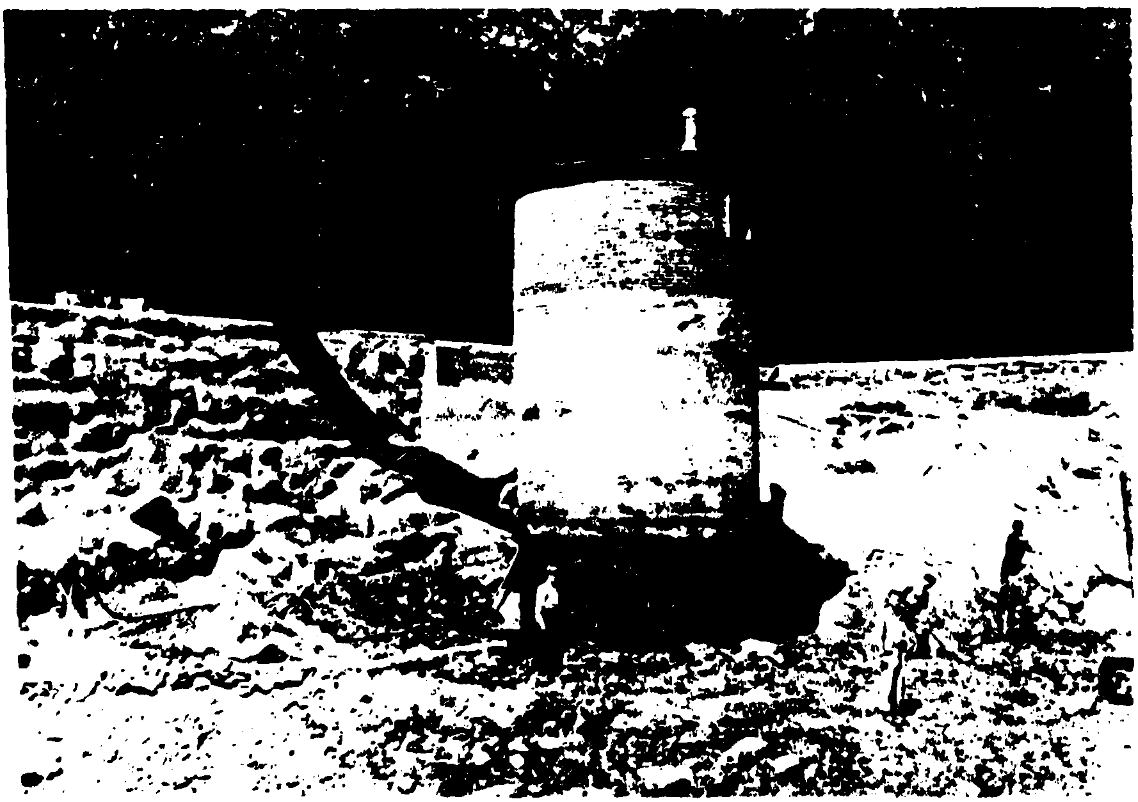












APPENDIX 5

HEC-1 OUTPUT SUMMARY

MINE HILL RESERVOIR DAM

```
 LINE      ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

   1       ID    MINE HILL RESERVOIR DAM  OVERTOPPING ANALYSIS  TOM GOOCH ANCO
   2       ID    NEW JERSEY DAM NO.777 - MORRIS COUNTY - MOUNT OLIVE TOWNSHIP
   3       ID    0.1,0.25,0.5,1.0 MULTIPLES OF PMF FROM 24-HOUR PMP
   4       IT        5               0     300
   5       IO        2       1
   6       JR    FLOW      0.1    0.25     0.5     1.0

   7       KK        A1  MINE HILL RESERVOIR INFLOW HYDROGRAPH
   8       KM        INFLOW FROM SCS UNIT GRAPH COMPUTATIONS
   9       PA     1.77       0
  10       RF      5.3     5.3       1
  11       PM     22.3                      NG     113     123     132
  12       LU        1     0.1
  13       UD     0.97

  14       KK        A2  ROUTE INFLOW HYDROGRAPH THROUGH MINE HILL RESERVOIR
  15       RS        1    STOR    31.9
  16       SV        0    31.9     35.    35.3    38.2    41.1     44.     50.    58.5
  17       SE     775.   800.7   801.9    802.    803.    804.    805.    807.    810.
  18       SQ       0.      0.     37.     46.    715.   2087.   3918.   8798.  18588.
  19       SE     775.   800.7   801.9    802.    803.    804.    805.    807.    810.
  20       SS    801.0     12.     3.1     1.5
  21       ST    802.0    85.8     0.0     1.5
  22       ZZ
```

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*****************************************                    *****************************************
*                                       *                    *                                       *
*  FLOOD HYDROGRAPH PACKAGE  (HEC-1)    *                    *   U.S. ARMY CORPS OF ENGINEERS        *
*            FEBRUARY 1981              *                    * THE HYDROLOGIC ENGINEERING CENTER     *
*                                       *                    *        609 SECOND STREET              *
*                                       *                    *      DAVIS, CALIFORNIA 95616          *
* RUN DATE06/24/81      TIME16.47.59    *                    * (916) 440-3285 OR (FTS) 448-3285      *
*                                       *                    *                                       *
*****************************************                    *****************************************


                    MINE HILL RESERVOIR DAM  OVERTOPPING ANALYSIS  TOM GOOCH ANCO
                    NEW JERSEY DAM NO.777 - MORRIS COUNTY - MOUNT OLIVE TOWNSHIP
                    0.1,0.25,0.5,1.0 MULTIPLES OF PMF FROM 24-HOUR PMP

  5 IO         OUTPUT CONTROL VARIABLES
                     IPRNT          2  PRINT CONTROL
                     IPLOT          1  PLOT CONTROL
                     QSCAL         0.  HYDROGRAPH PLOT SCALE
                      CMSG        YES  PRINT DIAGNOSTIC MESSAGES

   IT          HYDROGRAPH TIME DATA
                      NMIN          5  MINUTES IN COMPUTATION INTERVAL
                     IDATE      1   0  STARTING DATE
                     ITIME       0000  STARTING TIME
                        NQ        300  NUMBER OF HYDROGRAPH ORDINATES
                    NDDATE      2   0  ENDING DATE
                    NDTIME       0055  ENDING TIME

                COMPUTATION INTERVAL    0.08 HOURS
                     TOTAL TIME BASE   24.92 HOURS

          ENGLISH UNITS
               DRAINAGE AREA          SQUARE MILES
               PRECIPITATION DEPTH    INCHES
               LENGTH, ELEVATION      FEET
               FLOW                   CUBIC FEET PER SECOND
               STORAGE VOLUME         ACRE-FEET
               SURFACE AREA           ACRES
               TEMPERATURE            DEGREES FAHRENHEIT

   JP          MULTI-PLAN OPTION
                     NPLAN          1  NUMBER OF PLANS

   JR          MULTI-RATIO OPTION
                  RATIOS OF RUNOFF
                0.10      0.25      0.50      1.00

** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** **

          ***************
          *             *
  7 KK    *      A1     *        MINE HILL RESERVOIR INFLOW HYDROGRAPH
          *             *
          ***************
                             INFLOW FROM SCS UNIT GRAPH COMPUTATIONS

               SUBBASIN RUNOFF DATA

  9 BA         SUBBASIN CHARACTERISTICS
                      TAREA      1.77  SUBBASIN AREA

 10 BF         BASE FLOW CHARACTERISTICS
                     STRTQ       5.30  INITIAL FLOW
                     QRCSN       5.30  BEGIN BASE FLOW RECESSION
                     RTIOR    1.00000  RECESSION CONSTANT
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                PRECIPITATION DATA

11 PM           PROBABLE MAXIMUM STORM
                     PMS        22.30   INDEX PRECIPITATION
                     TRSPC       0.80   TRANSPOSITION COEFFICIENT
                     TRSDA       1.77   TRANSPOSITION AREA
                     SWD           NO   USE SWD DISTRIBUTION

                  PERCENT OF INDEX PRECIPITATION OCCURRING IN GIVEN TIME
                      6-HR   12-HR   24-HR   48-HR   72-HR   96-HR
                     113.0   123.0   132.0     0.0     0.0     0.0

12 LU           UNIFORM LOSS RATE
                     STRTL       1.00   INITIAL LOSS
                     CNSTL       0.10   UNIFORM LOSS RATE
                     RTIMP       0.0    PERCENT IMPERVIOUS AREA

13 UD           SCS DIMENSIONLESS UNITGRAPH
                     TLAG        0.57   LAG

                                         ***

                                  UNIT HYDROGRAPH
                           60 END-OF-PERIOD ORDINATES
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21.	64.	120.	191.	278.	389.	520.	638.	732.	798.
837.	844.	839.	810.	765.	715.	659.	589.	509.	433.
371.	323.	282.	246.	218.	193.	169.	148.	127.	112.
98.	86.	75.	65.	57.	50.	43.	38.	33.	29.
26.	22.	20.	17.	15.	13.	11.	10.	9.	8.
7.	6.	6.	5.	4.	3.	3.	2.	1.	0.

HYDROGRAPH AT STATION A1

DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q	DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q
1		0000	1	0.0	0.0	0.0	5.	1		1230	151	0.17	0.01	0.16	383.
1		0005	2	0.01	0.01	0.00	5.	1		1235	152	0.17	0.01	0.16	457.
1		0010	3	0.01	0.01	0.00	5.	1		1240	153	0.17	0.01	0.16	549.
1		0015	4	0.01	0.01	0.00	5.	1		1245	154	0.17	0.01	0.16	654.
1		0020	5	0.01	0.01	0.00	5.	1		1250	155	0.17	0.01	0.16	768.
1		0025	6	0.01	0.01	0.00	5.	1		1255	156	0.17	0.01	0.16	888.
1		0030	7	0.01	0.01	0.00	5.	1		1300	157	0.17	0.01	0.16	1009.
1		0035	8	0.01	0.01	0.00	5.	1		1305	158	0.20	0.01	0.19	1130.
1		0040	9	0.01	0.01	0.00	5.	1		1310	159	0.20	0.01	0.19	1246.
1		0045	10	0.01	0.01	0.00	5.	1		1315	160	0.20	0.01	0.19	1361.
1		0050	11	0.01	0.01	0.00	5.	1		1320	161	0.20	0.01	0.19	1470.
1		0055	12	0.01	0.01	0.00	5.	1		1325	162	0.20	0.01	0.19	1574.
1		0100	13	0.01	0.01	0.00	5.	1		1330	163	0.20	0.01	0.19	1671.
1		0105	14	0.01	0.01	0.00	5.	1		1335	164	0.20	0.01	0.19	1762.
1		0110	15	0.01	0.01	0.00	5.	1		1340	165	0.20	0.01	0.19	1845.
1		0115	16	0.01	0.01	0.00	5.	1		1345	166	0.20	0.01	0.19	1923.
1		0120	17	0.01	0.01	0.00	5.	1		1350	167	0.20	0.01	0.19	1996.
1		0125	18	0.01	0.01	0.00	5.	1		1355	168	0.20	0.01	0.19	2064.
1		0130	19	0.01	0.01	0.00	5.	1		1400	169	0.20	0.01	0.19	2126.
1		0135	20	0.01	0.01	0.00	5.	1		1405	170	0.25	0.01	0.24	2189.
1		0140	21	0.01	0.01	0.00	5.	1		1410	171	0.25	0.01	0.24	2247.
1		0145	22	0.01	0.01	0.00	5.	1		1415	172	0.25	0.01	0.24	2303.
1		0150	23	0.01	0.01	0.00	5.	1		1420	173	0.25	0.01	0.24	2357.
1		0155	24	0.01	0.01	0.00	5.	1		1425	174	0.25	0.01	0.24	2412.
1		0200	25	0.01	0.01	0.00	5.	1		1430	175	0.25	0.01	0.24	2467.

I	0205	26	0.01	0.01	0.00	5.	*	I	1435	176	0.25	0.01	0.24	2525.
I	0210	27	0.01	0.01	0.00	5.	*	I	1440	177	0.25	0.01	0.24	2584.
I	0215	28	0.01	0.01	0.00	5.	*	I	1445	178	0.25	0.01	0.24	2644.
I	0220	29	0.01	0.01	0.00	5.	*	I	1450	179	0.25	0.01	0.24	2704.
I	0225	30	0.01	0.01	0.00	5.	*	I	1455	180	0.25	0.01	0.24	2764.
I	0230	31	0.01	0.01	0.00	5.	*	I	1500	181	0.25	0.01	0.24	2822.
I	0235	32	0.01	0.01	0.00	5.	*	I	1505	182	0.23	0.01	0.22	2876.
I	0240	33	0.01	0.01	0.00	5.	*	I	1510	183	0.31	0.01	0.30	2930.
I	0245	34	0.01	0.01	0.00	5.	*	I	1515	184	0.38	0.01	0.37	2983.
I	0250	35	0.01	0.01	0.00	5.	*	I	1520	185	0.46	0.01	0.45	3040.
I	0255	36	0.01	0.01	0.00	5.	*	I	1525	186	0.69	0.01	0.68	3108.
I	0300	37	0.01	0.01	0.00	5.	*	I	1530	187	1.30	0.01	1.29	3209.
I	0305	38	0.01	0.01	0.00	5.	*	I	1535	188	1.92	0.01	1.91	3374.
I	0310	39	0.01	0.01	0.00	5.	*	I	1540	189	0.64	0.01	0.63	3613.
I	0315	40	0.01	0.01	0.00	5.	*	I	1545	190	0.61	0.01	0.60	3920.
I	0320	41	0.01	0.01	0.00	5.	*	I	1550	191	0.38	0.01	0.37	4295.
I	0325	42	0.01	0.01	0.00	5.	*	I	1555	192	0.31	0.01	0.30	4741.
I	0330	43	0.01	0.01	0.00	5.	*	I	1600	193	0.23	0.01	0.22	5247.
I	0335	44	0.01	0.01	0.00	5.	*	I	1605	194	0.24	0.01	0.23	5771.
I	0340	45	0.01	0.01	0.00	5.	*	I	1610	195	0.24	0.01	0.23	6245.
I	0345	46	0.01	0.01	0.00	5.	*	I	1615	196	0.24	0.01	0.23	6632.
I	0350	47	0.01	0.01	0.00	5.	*	I	1620	197	0.24	0.01	0.23	6906.
I	0355	48	0.01	0.01	0.00	5.	*	I	1625	198	0.24	0.01	0.23	7059.
I	0400	49	0.01	0.01	0.00	5.	*	I	1630	199	0.24	0.01	0.23	7099.
I	0405	50	0.01	0.01	0.00	5.	*	I	1635	200	0.24	0.01	0.23	7047.
I	0410	51	0.01	0.01	0.00	5.	*	I	1640	201	0.24	0.01	0.23	6907.
I	0415	52	0.01	0.01	0.00	5.	*	I	1645	202	0.24	0.01	0.23	6702.
I	0420	53	0.01	0.01	0.00	5.	*	I	1650	203	0.24	0.01	0.23	6453.
I	0425	54	0.01	0.01	0.00	5.	*	I	1655	204	0.24	0.01	0.23	6165.
I	0430	55	0.01	0.01	0.00	5.	*	I	1700	205	0.24	0.01	0.23	5842.
I	0435	56	0.01	0.01	0.00	5.	*	I	1705	206	0.18	0.01	0.18	5502.
I	0440	57	0.01	0.01	0.00	5.	*	I	1710	207	0.18	0.01	0.18	5186.
I	0445	58	0.01	0.01	0.00	5.	*	I	1715	208	0.18	0.01	0.18	4895.
I	0450	59	0.01	0.01	0.00	5.	*	I	1720	209	0.18	0.01	0.18	4649.
I	0455	60	0.01	0.01	0.00	5.	*	I	1725	210	0.18	0.01	0.18	4434.
I	0500	61	0.01	0.01	0.00	5.	*	I	1730	211	0.18	0.01	0.18	4246.
I	0505	62	0.01	0.01	0.00	5.	*	I	1735	212	0.18	0.01	0.18	4077.
I	0510	63	0.01	0.01	0.00	5.	*	I	1740	213	0.18	0.01	0.18	3919.
I	0515	64	0.01	0.01	0.00	5.	*	I	1745	214	0.18	0.01	0.18	3769.
I	0520	65	0.01	0.01	0.00	5.	*	I	1750	215	0.18	0.01	0.18	3626.
I	0525	66	0.01	0.01	0.00	5.	*	I	1755	216	0.18	0.01	0.18	3496.
I	0530	67	0.01	0.01	0.00	5.	*	I	1800	217	0.18	0.01	0.18	3377.
I	0535	68	0.01	0.01	0.00	5.	*	I	1805	218	0.01	0.01	0.01	3264.
I	0540	69	0.01	0.01	0.00	5.	*	I	1810	219	0.01	0.01	0.01	3154.
I	0545	70	0.01	0.01	0.00	5.	*	I	1815	220	0.01	0.01	0.01	3043.
I	0550	71	0.01	0.01	0.00	5.	*	I	1820	221	0.01	0.01	0.01	2926.
I	0555	72	0.01	0.01	0.00	5.	*	I	1825	222	0.01	0.01	0.01	2806.
I	0600	73	0.01	0.01	0.00	5.	*	I	1830	223	0.01	0.01	0.01	2677.
I	0605	74	0.02	0.02	0.00	5.	*	I	1835	224	0.01	0.01	0.01	2532.
I	0610	75	0.02	0.02	0.00	5.	*	I	1840	225	0.01	0.01	0.01	2375.
I	0615	76	0.02	0.02	0.00	5.	*	I	1845	226	0.01	0.01	0.01	2206.
I	0620	77	0.02	0.02	0.00	5.	*	I	1850	227	0.01	0.01	0.01	2035.
I	0625	78	0.02	0.02	0.00	5.	*	I	1855	228	0.01	0.01	0.01	1860.
I	0630	79	0.02	0.02	0.00	5.	*	I	1900	229	0.01	0.01	0.01	1688.
I	0635	80	0.02	0.02	0.00	5.	*	I	1905	230	0.01	0.01	0.01	1519.
I	0640	81	0.02	0.02	0.00	5.	*	I	1910	231	0.01	0.01	0.01	1359.
I	0645	82	0.02	0.02	0.00	5.	*	I	1915	232	0.01	0.01	0.01	1209.
I	0650	83	0.02	0.02	0.00	5.	*	I	1920	233	0.01	0.01	0.01	1070.
I	0655	84	0.02	0.02	0.00	5.	*	I	1925	234	0.01	0.01	0.01	943.
I	0700	85	0.02	0.02	0.00	5.	*	I	1930	235	0.01	0.01	0.01	830.
I	0705	86	0.02	0.02	0.00	5.	*	I	1935	236	0.01	0.01	0.01	732.
I	0710	87	0.02	0.02	0.00	5.	*	I	1940	237	0.01	0.01	0.01	649.
I	0715	88	0.02	0.02	0.01	5.	*	I	1945	238	0.01	0.01	0.01	577.
I	0720	89	0.02	0.01	0.02	6.	*	I	1950	239	0.01	0.01	0.01	514.
I	0725	90	0.02	0.01	0.02	8.	*	I	1955	240	0.01	0.01	0.01	459.
I	0730	91	0.02	0.01	0.02	10.	*	I	2000	241	0.01	0.01	0.01	410.
I	0735	92	0.02	0.01	0.02	14.	*	I	2005	242	0.01	0.01	0.01	367.
I	0740	93	0.02	0.01	0.02	20.	*	I	2010	243	0.01	0.01	0.01	328.
I	0745	94	0.02	0.01	0.02	28.	*	I	2015	244	0.01	0.01	0.01	295.
I	0750	95	0.02	0.01	0.02	37.	*	I	2020	245	0.01	0.01	0.01	264.
I	0755	96	0.02	0.01	0.02	49.	*	I	2025	246	0.01	0.01	0.01	238.

1	0805	98	0.02	0.01	0.02	75.	*	1	2035	248	0.01	0.01	0.01	196.
1	0810	99	0.02	0.01	0.02	89.	*	1	2040	249	0.01	0.01	0.01	180.
1	0815	100	0.02	0.01	0.02	102.	*	1	2045	250	0.01	0.01	0.01	166.
1	0820	101	0.02	0.01	0.02	116.	*	1	2050	251	0.01	0.01	0.01	154.
1	0825	102	0.02	0.01	0.02	129.	*	1	2055	252	0.01	0.01	0.01	143.
1	0830	103	0.02	0.01	0.02	141.	*	1	2100	253	0.01	0.01	0.01	134.
1	0835	104	0.02	0.01	0.02	152.	*	1	2105	254	0.01	0.01	0.01	126.
1	0840	105	0.02	0.01	0.02	162.	*	1	2110	255	0.01	0.01	0.01	119.
1	0845	106	0.02	0.01	0.02	171.	*	1	2115	256	0.01	0.01	0.01	113.
1	0850	107	0.02	0.01	0.02	179.	*	1	2120	257	0.01	0.01	0.01	108.
1	0855	108	0.02	0.01	0.02	186.	*	1	2125	258	0.01	0.01	0.01	103.
1	0900	109	0.02	0.01	0.02	191.	*	1	2130	259	0.01	0.01	0.01	99.
1	0905	110	0.02	0.01	0.02	196.	*	1	2135	260	0.01	0.01	0.01	96.
1	0910	111	0.02	0.01	0.02	200.	*	1	2140	261	0.01	0.01	0.01	93.
1	0915	112	0.02	0.01	0.02	204.	*	1	2145	262	0.01	0.01	0.01	90.
1	0920	113	0.02	0.01	0.02	208.	*	1	2150	263	0.01	0.01	0.01	88.
1	0925	114	0.02	0.01	0.02	211.	*	1	2155	264	0.01	0.01	0.01	86.
1	0930	115	0.02	0.01	0.02	213.	*	1	2200	265	0.01	0.01	0.01	84.
1	0935	116	0.02	0.01	0.02	215.	*	1	2205	266	0.01	0.01	0.01	82.
1	0940	117	0.02	0.01	0.02	217.	*	1	2210	267	0.01	0.01	0.01	81.
1	0945	118	0.02	0.01	0.02	219.	*	1	2215	268	0.01	0.01	0.01	80.
1	0950	119	0.02	0.01	0.02	221.	*	1	2220	269	0.01	0.01	0.01	79.
1	0955	120	0.02	0.01	0.02	222.	*	1	2225	270	0.01	0.01	0.01	78.
1	1000	121	0.02	0.01	0.02	223.	*	1	2230	271	0.01	0.01	0.01	77.
1	1005	122	0.02	0.01	0.02	224.	*	1	2235	272	0.01	0.01	0.01	76.
1	1010	123	0.02	0.01	0.02	225.	*	1	2240	273	0.01	0.01	0.01	76.
1	1015	124	0.02	0.01	0.02	225.	*	1	2245	274	0.01	0.01	0.01	75.
1	1020	125	0.02	0.01	0.02	226.	*	1	2250	275	0.01	0.01	0.01	75.
1	1025	126	0.02	0.01	0.02	227.	*	1	2255	276	0.01	0.01	0.01	75.
1	1030	127	0.02	0.01	0.02	227.	*	1	2300	277	0.01	0.01	0.01	74.
1	1035	128	0.02	0.01	0.02	228.	*	1	2305	278	0.01	0.01	0.01	74.
1	1040	129	0.02	0.01	0.02	228.	*	1	2310	279	0.01	0.01	0.01	74.
1	1045	130	0.02	0.01	0.02	229.	*	1	2315	280	0.01	0.01	0.01	74.
1	1050	131	0.02	0.01	0.02	229.	*	1	2320	281	0.01	0.01	0.01	74.
1	1055	132	0.02	0.01	0.02	229.	*	1	2325	282	0.01	0.01	0.01	74.
1	1100	133	0.02	0.01	0.02	229.	*	1	2330	283	0.01	0.01	0.01	74.
1	1105	134	0.02	0.01	0.02	230.	*	1	2335	284	0.01	0.01	0.01	74.
1	1110	135	0.02	0.01	0.02	230.	*	1	2340	285	0.01	0.01	0.01	74.
1	1115	136	0.02	0.01	0.02	230.	*	1	2345	286	0.01	0.01	0.01	74.
1	1120	137	0.02	0.01	0.02	230.	*	1	2350	287	0.01	0.01	0.01	74.
1	1125	138	0.02	0.01	0.02	230.	*	1	2355	288	0.01	0.01	0.01	74.
1	1130	139	0.02	0.01	0.02	230.	*	2	0000	289	0.0	0.0	0.0	74.
1	1135	140	0.02	0.01	0.02	230.	*	2	0005	290	0.0	0.0	0.0	74.
1	1140	141	0.02	0.01	0.02	230.	*	2	0010	291	0.0	0.0	0.0	73.
1	1145	142	0.02	0.01	0.02	231.	*	2	0015	292	0.0	0.0	0.0	72.
1	1150	143	0.02	0.01	0.02	231.	*	2	0020	293	0.0	0.0	0.0	71.
1	1155	144	0.02	0.01	0.02	231.	*	2	0025	294	0.0	0.0	0.0	69.
1	1200	145	0.02	0.01	0.02	231.	*	2	0030	295	0.0	0.0	0.0	66.
1	1205	146	0.17	0.01	0.16	234.	*	2	0035	296	0.0	0.0	0.0	63.
1	1210	147	0.17	0.01	0.16	243.	*	2	0040	297	0.0	0.0	0.0	60.
1	1215	148	0.17	0.01	0.16	260.	*	2	0045	298	0.0	0.0	0.0	56.
1	1220	149	0.17	0.01	0.16	287.	*	2	0050	299	0.0	0.0	0.0	51.
1	1225	150	0.17	0.01	0.16	327.	*	2	0055	300	0.0	0.0	0.0	47.
							*			SUM	23.53	2.67	20.86	

PEAK FLOW (CFS)	TIME (HR)		6-HR	MAXIMUM AVERAGE FLOW 24-HR	72-HR	24.92-HR
7099.	16.50	(CFS)	3535.	997.	961.	961.
		(INCHES)	18.570	20.952	20.956	20.956
		(AC-FT)	1753.	1978.	1978.	1978.

CUMULATIVE AREA = 1.77 SQ MI

AD-A103 775   NEW JERSEY DEPT OF ENVIRONMENTAL PROTECTION TRENTON --ETC F/G 13/13
NATIONAL DAM SAFETY PROGRAM. MINE HILL RESERVOIR DAM (NJ00777), --ETC(U)
AUG 81 W A GUINAN DACW61-79-C-0011

UNCLASSIFIED DAEN/NAP-53842/NJ00777-81/ NL

2 OF

HYDROGRAPH AT STATION A1
PLAN 1, RATIO = 0.50

DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW
1		0000	1	3.	1		0615	76	3.	1		1230	151	191.	1		1845	226	1104.
1		0005	2	3.	1		0620	77	3.	1		1235	152	229.	1		1850	227	1016.
1		0010	3	3.	1		0625	78	3.	1		1240	153	274.	1		1855	228	930.
1		0015	4	3.	1		0630	79	3.	1		1245	154	327.	1		1900	229	844.
1		0020	5	3.	1		0635	80	3.	1		1250	155	384.	1		1905	230	760.
1		0025	6	3.	1		0640	81	3.	1		1255	156	444.	1		1910	231	679.
1		0030	7	3.	1		0645	82	3.	1		1300	157	504.	1		1915	232	604.
1		0035	8	3.	1		0650	83	3.	1		1305	158	565.	1		1920	233	535.
1		0040	9	3.	1		0655	84	3.	1		1310	159	624.	1		1925	234	471.
1		0045	10	3.	1		0700	85	3.	1		1315	160	681.	1		1930	235	415.
1		0050	11	3.	1		0705	86	3.	1		1320	161	735.	1		1935	236	366.
1		0055	12	3.	1		0710	87	3.	1		1325	162	787.	1		1940	237	324.
1		0100	13	3.	1		0715	88	3.	1		1330	163	836.	1		1945	238	288.
1		0105	14	3.	1		0720	89	3.	1		1335	164	881.	1		1950	239	257.
1		0110	15	3.	1		0725	90	4.	1		1340	165	923.	1		1955	240	229.
1		0115	16	3.	1		0730	91	5.	1		1345	166	961.	1		2000	241	205.
1		0120	17	3.	1		0735	92	7.	1		1350	167	998.	1		2005	242	183.
1		0125	18	3.	1		0740	93	10.	1		1355	168	1032.	1		2010	243	164.
1		0130	19	3.	1		0745	94	14.	1		1400	169	1064.	1		2015	244	147.
1		0135	20	3.	1		0750	95	19.	1		1405	170	1094.	1		2020	245	132.
1		0140	21	3.	1		0755	96	24.	1		1410	171	1123.	1		2025	246	119.
1		0145	22	3.	1		0800	97	31.	1		1415	172	1151.	1		2030	247	108.
1		0150	23	3.	1		0805	98	37.	1		1420	173	1179.	1		2035	248	98.
1		0155	24	3.	1		0810	99	44.	1		1425	174	1206.	1		2040	249	90.
1		0200	25	3.	1		0815	100	51.	1		1430	175	1234.	1		2045	250	83.
1		0205	26	3.	1		0820	101	58.	1		1435	176	1262.	1		2050	251	77.
1		0210	27	3.	1		0825	102	64.	1		1440	177	1292.	1		2055	252	72.
1		0215	28	3.	1		0830	103	70.	1		1445	178	1322.	1		2100	253	67.
1		0220	29	3.	1		0835	104	76.	1		1450	179	1352.	1		2105	254	63.
1		0225	30	3.	1		0840	105	81.	1		1455	180	1382.	1		2110	255	60.
1		0230	31	3.	1		0845	106	86.	1		1500	181	1411.	1		2115	256	57.
1		0235	32	3.	1		0850	107	89.	1		1505	182	1439.	1		2120	257	54.
1		0240	33	3.	1		0855	108	93.	1		1510	183	1465.	1		2125	258	52.
1		0245	34	3.	1		0900	109	96.	1		1515	184	1492.	1		2130	259	50.
1		0250	35	3.	1		0905	110	98.	1		1520	185	1520.	1		2135	260	48.
1		0255	36	3.	1		0910	111	100.	1		1525	186	1554.	1		2140	261	46.
1		0300	37	3.	1		0915	112	102.	1		1530	187	1605.	1		2145	262	45.

1	0305	38	5.	*	1	0920	113	208.	*	1	1535	188	3374.	*	1	2150	263	88.
1	0310	39	5.	*	1	0925	114	211.	*	1	1540	189	3613.	*	1	2155	264	86.
1	0315	40	5.	*	1	0930	115	213.	*	1	1545	190	3920.	*	1	2200	265	84.
1	0320	41	5.	*	1	0935	116	215.	*	1	1550	191	4295.	*	1	2205	266	82.
1	0325	42	5.	*	1	0940	117	217.	*	1	1555	192	4741.	*	1	2210	267	81.
1	0330	43	5.	*	1	0945	118	219.	*	1	1600	193	5247.	*	1	2215	268	80.
1	0335	44	5.	*	1	0950	119	221.	*	1	1605	194	5771.	*	1	2220	269	79.
1	0340	45	5.	*	1	0955	120	222.	*	1	1610	195	6245.	*	1	2225	270	78.
1	0345	46	5.	*	1	1000	121	223.	*	1	1615	196	6632.	*	1	2230	271	77.
1	0350	47	5.	*	1	1005	122	224.	*	1	1620	197	6906.	*	1	2235	272	76.
1	0355	48	5.	*	1	1010	123	225.	*	1	1625	198	7059.	*	1	2240	273	76.
1	0400	49	5.	*	1	1015	124	226.	*	1	1630	199	7099.	*	1	2245	274	75.
1	0405	50	5.	*	1	1020	125	226.	*	1	1635	200	7047.	*	1	2250	275	75.
1	0410	51	5.	*	1	1025	126	227.	*	1	1640	201	6907.	*	1	2255	276	75.
1	0415	52	5.	*	1	1030	127	227.	*	1	1645	202	6702.	*	1	2300	277	74.
1	0420	53	5.	*	1	1035	128	228.	*	1	1650	203	6453.	*	1	2305	278	74.
1	0425	54	5.	*	1	1040	129	228.	*	1	1655	204	6165.	*	1	2310	279	74.
1	0430	55	5.	*	1	1045	130	229.	*	1	1700	205	5842.	*	1	2315	280	74.
1	0435	56	5.	*	1	1050	131	229.	*	1	1705	206	5502.	*	1	2320	281	74.
1	0440	57	5.	*	1	1055	132	229.	*	1	1710	207	5180.	*	1	2325	282	74.
1	0445	58	5.	*	1	1100	133	229.	*	1	1715	208	4895.	*	1	2330	283	74.
1	0450	59	5.	*	1	1105	134	230.	*	1	1720	209	4649.	*	1	2335	284	74.
1	0455	60	5.	*	1	1110	135	230.	*	1	1725	210	4434.	*	1	2340	285	74.
1	0500	61	5.	*	1	1115	136	230.	*	1	1730	211	4246.	*	1	2345	286	74.
1	0505	62	5.	*	1	1120	137	230.	*	1	1735	212	4077.	*	1	2350	287	74.
1	0510	63	5.	*	1	1125	138	230.	*	1	1740	213	3919.	*	1	2355	288	74.
1	0515	64	5.	*	1	1130	139	230.	*	1	1745	214	3769.	*	2	0000	289	74.
1	0520	65	5.	*	1	1135	140	230.	*	1	1750	215	3628.	*	2	0005	290	74.
1	0525	66	5.	*	1	1140	141	230.	*	1	1755	216	3496.	*	2	0010	291	73.
1	0530	67	5.	*	1	1145	142	231.	*	1	1800	217	3377.	*	2	0015	292	72.
1	0535	68	5.	*	1	1150	143	231.	*	1	1805	218	3264.	*	2	0020	293	71.
1	0540	69	5.	*	1	1155	144	231.	*	1	1810	219	3154.	*	2	0025	294	69.
1	0545	70	5.	*	1	1200	145	231.	*	1	1815	220	3043.	*	2	0030	295	66.
1	0550	71	5.	*	1	1205	146	234.	*	1	1820	221	2928.	*	2	0035	296	63.
1	0555	72	5.	*	1	1210	147	243.	*	1	1825	222	2808.	*	2	0040	297	60.
1	0600	73	5.	*	1	1215	148	260.	*	1	1830	223	2677.	*	2	0045	298	56.
1	0605	74	5.	*	1	1220	149	287.	*	1	1835	224	2532.	*	2	0050	299	51.
1	0610	75	5.	*	1	1225	150	327.	*	1	1840	225	2375.	*	2	0055	300	47.

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	24.92-HR
7099.	16.50	(CFS)	3535.	997.	961.	961.
		(INCHES)	10.570	20.952	20.956	20.956
		(AC-FT)	1753.	1978.	1978.	1978.

CUMULATIVE AREA = 1.77 SQ MI

HYDROGRAPH AT STATION A1
PLAN 1, RATIO = 1.00

DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW
1		0000	1	5.	1		0615	76	5.	1		1230	151	383.	1		1845	226	2208.
1		0005	2	5.	1		0620	77	5.	1		1235	152	457.	1		1850	227	2035.
1		0010	3	5.	1		0625	78	5.	1		1240	153	549.	1		1855	228	1860.
1		0015	4	5.	1		0630	79	5.	1		1245	154	654.	1		1900	229	1686.
1		0020	5	5.	1		0635	80	5.	1		1250	155	768.	1		1905	230	1519.
1		0025	6	5.	1		0640	81	5.	1		1255	156	888.	1		1910	231	1359.
1		0030	7	5.	1		0645	82	5.	1		1300	157	1009.	1		1915	232	1209.
1		0035	8	5.	1		0650	83	5.	1		1305	158	1130.	1		1920	233	1070.
1		0040	9	5.	1		0655	84	5.	1		1310	159	1248.	1		1925	234	943.
1		0045	10	5.	1		0700	85	5.	1		1315	160	1361.	1		1930	235	830.
1		0050	11	5.	1		0705	86	5.	1		1320	161	1470.	1		1935	236	732.
1		0055	12	5.	1		0710	87	5.	1		1325	162	1574.	1		1940	237	649.
1		0100	13	5.	1		0715	88	5.	1		1330	163	1671.	1		1945	238	577.
1		0105	14	5.	1		0720	89	6.	1		1335	164	1762.	1		1950	239	514.
1		0110	15	5.	1		0725	90	8.	1		1340	165	1845.	1		1955	240	459.
1		0115	16	5.	1		0730	91	10.	1		1345	166	1923.	1		2000	241	410.
1		0120	17	5.	1		0735	92	14.	1		1350	167	1996.	1		2005	242	367.
1		0125	18	5.	1		0740	93	20.	1		1355	168	2064.	1		2010	243	328.
1		0130	19	5.	1		0745	94	28.	1		1400	169	2128.	1		2015	244	295.
1		0135	20	5.	1		0750	95	37.	1		1405	170	2189.	1		2020	245	264.
1		0140	21	5.	1		0755	96	49.	1		1410	171	2247.	1		2025	246	238.
1		0145	22	5.	1		0800	97	61.	1		1415	172	2303.	1		2030	247	216.
1		0150	23	5.	1		0805	98	75.	1		1420	173	2357.	1		2035	248	196.
1		0155	24	5.	1		0810	99	89.	1		1425	174	2412.	1		2040	249	180.
1		0200	25	5.	1		0815	100	102.	1		1430	175	2467.	1		2045	250	166.
1		0205	26	5.	1		0820	101	116.	1		1435	176	2525.	1		2050	251	154.
1		0210	27	5.	1		0825	102	129.	1		1440	177	2584.	1		2055	252	143.
1		0215	28	5.	1		0830	103	141.	1		1445	178	2644.	1		2100	253	134.
1		0220	29	5.	1		0835	104	152.	1		1450	179	2704.	1		2105	254	126.
1		0225	30	5.	1		0840	105	162.	1		1455	180	2764.	1		2110	255	119.
1		0230	31	5.	1		0845	106	171.	1		1500	181	2822.	1		2115	256	113.
1		0235	32	5.	1		0850	107	179.	1		1505	182	2878.	1		2120	257	108.
1		0240	33	5.	1		0855	108	186.	1		1510	183	2930.	1		2125	258	103.
1		0245	34	5.	1		0900	109	191.	1		1515	184	2983.	1		2130	259	99.
1		0250	35	5.	1		0905	110	196.	1		1520	185	3040.	1		2135	260	96.
1		0255	36	5.	1		0910	111	200.	1		1525	186	3108.	1		2140	261	93.
1		0300	37	5.	1		0915	112	204.	1		1530	187	3209.	1		2145	262	90.
1		0305	38	5.	1		0920	113	209.	1		1535	188	3374.	1		2150	263	88.
1		0310	39	5.	1		0925	114	211.	1		1540	189	3613.	1		2155	264	86.
1		0315	40	5.	1		0930	115	213.	1		1545	190	3920.	1		2200	265	84.
1		0320	41	5.	1		0935	116	215.	1		1550	191	4295.	1		2205	266	82.
1		0325	42	5.	1		0940	117	217.	1		1555	192	4741.	1		2210	267	81.
1		0330	43	5.	1		0945	118	219.	1		1600	193	5247.	1		2215	268	80.

1	0335	44	5.	1	0950	119	221.	1	1605	194	5771.	1	2220	269	79.
1	0340	45	5.	1	0955	120	222.	1	1610	195	6245.	1	2225	270	78.
1	0345	46	5.	1	1000	121	223.	1	1615	196	6632.	1	2230	271	77.
1	0350	47	5.	1	1005	122	224.	1	1620	197	6906.	1	2235	272	76.
1	0355	48	5.	1	1010	123	225.	1	1625	198	7059.	1	2240	273	76.
1	0400	49	5.	1	1015	124	226.	1	1630	199	7099.	1	2245	274	75.
1	0405	50	5.	1	1020	125	226.	1	1635	200	7047.	1	2250	275	75.
1	0410	51	5.	1	1025	126	227.	1	1640	201	6907.	1	2255	276	75.
1	0415	52	5.	1	1030	127	227.	1	1645	202	6702.	1	2300	277	74.
1	0420	53	5.	1	1035	128	228.	1	1650	203	6453.	1	2305	278	74.
1	0425	54	5.	1	1040	129	228.	1	1655	204	6165.	1	2310	279	74.
1	0430	55	5.	1	1045	130	229.	1	1700	205	5842.	1	2315	280	74.
1	0435	56	5.	1	1050	131	229.	1	1705	206	5502.	1	2320	281	74.
1	0440	57	5.	1	1055	132	229.	1	1710	207	5180.	1	2325	282	74.
1	0445	58	5.	1	1100	133	229.	1	1715	208	4895.	1	2330	283	74.
1	0450	59	5.	1	1105	134	230.	1	1720	209	4649.	1	2335	284	74.
1	0455	60	5.	1	1110	135	230.	1	1725	210	4434.	1	2340	285	74.
1	0500	61	5.	1	1115	136	230.	1	1730	211	4246.	1	2345	286	74.
1	0505	62	5.	1	1120	137	230.	1	1735	212	4077.	1	2350	287	74.
1	0510	63	5.	1	1125	138	230.	1	1740	213	3919.	1	2355	288	74.
1	0515	64	5.	1	1130	139	230.	1	1745	214	3769.	2	0000	289	74.
1	0520	65	5.	1	1135	140	230.	1	1750	215	3628.	2	0005	290	74.
1	0525	66	5.	1	1140	141	230.	1	1755	216	3496.	2	0010	291	73.
1	0530	67	5.	1	1145	142	231.	1	1800	217	3377.	2	0015	292	72.
1	0535	68	5.	1	1150	143	231.	1	1805	218	3264.	2	0020	293	71.
1	0540	69	5.	1	1155	144	231.	1	1810	219	3154.	2	0025	294	69.
1	0545	70	5.	1	1200	145	231.	1	1815	220	3043.	2	0030	295	66.
1	0550	71	5.	1	1205	146	234.	1	1820	221	2928.	2	0035	296	63.
1	0555	72	5.	1	1210	147	243.	1	1825	222	2808.	2	0040	297	60.
1	0600	73	5.	1	1215	148	260.	1	1830	223	2677.	2	0045	298	56.
1	0605	74	5.	1	1220	149	287.	1	1835	224	2532.	2	0050	299	51.
1	0610	75	5.	1	1225	150	327.	1	1840	225	2375.	2	0055	300	47.

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	24.92-HR
7099.	16.50	(CFS)	3535.	997.	961.	961.
		(INCHES)	16.570	20.952	20.956	20.956
		(AC-FT)	1753.	1976.	1978.	1978.

CUMULATIVE AREA = 1.77 SQ MI

14 KK A2 ROUTE INFLOW HYDROGRAPH THROUGH MINE HILL RESERVOIR

HYDROGRAPH ROUTING DATA

15 RS STORAGE ROUTING

NSTPS	1	NUMBER OF SUBREACHES
ITYP	STOR	TYPE OF INITIAL CONDITION
RSVRIC	31.90	INITIAL CONDITION
X	0.0	WORKING R AND D COEFFICIENT

16 SV	STORAGE	0.0	31.9	35.0	35.3	38.2	41.1	44.0	50.0	58.5
17 SE	ELEVATION	775.00	800.70	801.90	802.00	803.00	804.00	805.00	807.00	810.00
18 SQ	DISCHARGE	0.	0.	37.	46.	715.	2087.	3918.	8798.	18588.
19 SL	ELEVATION	775.00	800.70	801.90	802.00	803.00	804.00	805.00	807.00	810.00

HYDROGRAPH AT STATION A2
PLAN 1, RATIO = 0.50

DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1		0000	1	0.	31.9	800.7	1		0820	101	18.	33.4	801.3	1		1640	201	3472.	43.3	804.8
1		0005	2	0.	31.9	800.7	1		0825	102	22.	33.7	801.4	1		1645	202	3376.	43.1	804.7
1		0010	3	0.	31.9	800.7	1		0830	103	25.	34.0	801.5	1		1650	203	3256.	43.0	804.6
1		0015	4	1.	31.9	800.7	1		0835	104	29.	34.3	801.6	1		1655	204	3117.	42.7	804.6
1		0020	5	1.	32.0	800.7	1		0840	105	33.	34.7	801.8	1		1700	205	2959.	42.5	804.5
1		0025	6	1.	32.0	800.7	1		0845	106	37.	35.0	801.9	1		1705	206	2790.	42.2	804.4
1		0030	7	1.	32.0	800.7	1		0850	107	47.	35.3	802.0	1		1710	207	2626.	42.0	804.3
1		0035	8	1.	32.0	800.7	1		0855	108	66.	35.5	802.1	1		1715	208	2479.	41.7	804.2
1		0040	9	1.	32.0	800.7	1		0900	109	93.	35.5	802.1	1		1720	209	2351.	41.5	804.1
1		0045	10	1.	32.0	800.7	1		0905	110	96.	35.5	802.1	1		1725	210	2241.	41.3	804.1
1		0050	11	1.	32.0	800.7	1		0910	111	99.	35.5	802.1	1		1730	211	2143.	41.2	804.0
1		0055	12	2.	32.0	800.7	1		0915	112	101.	35.5	802.1	1		1735	212	2061.	41.0	804.0
1		0100	13	2.	32.0	800.8	1		0920	113	103.	35.5	802.1	1		1740	213	1984.	40.9	803.9
1		0105	14	2.	32.0	800.8	1		0925	114	104.	35.6	802.1	1		1745	214	1907.	40.7	803.9
1		0110	15	2.	32.0	800.8	1		0930	115	106.	35.6	802.1	1		1750	215	1835.	40.6	803.6
1		0115	16	2.	32.1	800.8	1		0935	116	107.	35.6	802.1	1		1755	216	1768.	40.4	803.8
1		0120	17	2.	32.1	800.8	1		0940	117	108.	35.6	802.1	1		1800	217	1706.	40.3	803.7
1		0125	18	2.	32.1	800.8	1		0945	118	109.	35.6	802.1	1		1805	218	1649.	40.2	803.7
1		0130	19	2.	32.1	800.8	1		0950	119	110.	35.6	802.1	1		1810	219	1594.	40.1	803.6
1		0135	20	2.	32.1	800.8	1		0955	120	110.	35.6	802.1	1		1815	220	1538.	39.9	803.6
1		0140	21	2.	32.1	800.8	1		1000	121	111.	35.6	802.1	1		1820	221	1482.	39.8	803.6
1		0145	22	2.	32.1	800.8	1		1005	122	112.	35.6	802.1	1		1825	222	1422.	39.7	803.5
1		0150	23	2.	32.1	800.8	1		1010	123	112.	35.6	802.1	1		1830	223	1359.	39.6	803.5
1		0155	24	2.	32.1	800.8	1		1015	124	112.	35.6	802.1	1		1835	224	1288.	39.4	803.4
1		0200	25	2.	32.1	800.8	1		1020	125	113.	35.6	802.1	1		1840	225	1212.	39.2	803.4
1		0205	26	2.	32.1	800.8	1		1025	126	113.	35.6	802.1	1		1845	226	1130.	39.1	803.3
1		0210	27	2.	32.1	800.8	1		1030	127	113.	35.6	802.1	1		1850	227	1044.	38.9	803.2
1		0215	28	2.	32.1	800.8	1		1035	128	114.	35.6	802.1	1		1855	228	957.	38.7	803.2
1		0220	29	2.	32.1	800.8	1		1040	129	114.	35.6	802.1	1		1900	229	870.	38.5	803.1
1		0225	30	2.	32.1	800.8	1		1045	130	114.	35.6	802.1	1		1905	230	785.	38.3	803.1
1		0230	31	2.	32.1	800.8	1		1050	131	114.	35.6	802.1	1		1910	231	707.	38.2	803.0
1		0235	32	2.	32.1	800.8	1		1055	132	114.	35.6	802.1	1		1915	232	649.	37.9	802.9
1		0240	33	2.	32.1	800.8	1		1100	133	115.	35.6	802.1	1		1920	233	579.	37.6	802.6
1		0245	34	2.	32.1	800.8	1		1105	134	115.	35.6	802.1	1		1925	234	512.	37.3	802.7
1		0250	35	2.	32.1	800.8	1		1110	135	115.	35.6	802.1	1		1930	235	451.	37.1	802.6
1		0255	36	2.	32.1	800.8	1		1115	136	115.	35.6	802.1	1		1935	236	397.	36.8	802.5
1		0300	37	2.	32.1	800.8	1		1120	137	115.	35.6	802.1	1		1940	237	351.	36.6	802.5
1		0305	38	2.	32.1	800.8	1		1125	138	115.	35.6	802.1	1		1945	238	311.	36.5	802.4
1		0310	39	2.	32.1	800.8	1		1130	139	115.	35.6	802.1	1		1950	239	277.	36.3	802.3
1		0315	40	2.	32.1	800.8	1		1135	140	115.	35.6	802.1	1		1955	240	247.	36.2	802.3
1		0320	41	2.	32.1	800.8	1		1140	141	115.	35.6	802.1	1		2000	241	221.	36.1	802.3
1		0325	42	3.	32.1	800.8	1		1145	142	115.	35.6	802.1	1		2005	242	197.	36.0	802.2
1		0330	43	3.	32.1	800.8	1		1150	143	115.	35.6	802.1	1		2010	243	177.	35.9	802.2
1		0335	44	3.	32.1	800.8	1		1155	144	115.	35.6	802.1	1		2015	244	158.	35.8	802.2
1		0340	45	3.	32.1	800.8	1		1200	145	115.	35.6	802.1	1		2020	245	142.	35.7	802.1
1		0345	46	3.	32.1	800.8	1		1205	146	116.	35.6	802.1	1		2025	246	128.	35.7	802.1
1		0350	47	3.	32.1	800.8	1		1210	147	119.	35.6	802.1	1		2030	247	115.	35.6	802.1

1	0355	48	3.	32.1	800.8	*	1	1215	148	125.	35.6	802.1	*	1	2035	248	104.	35.6	802.1
1	0400	49	3.	32.1	800.8	*	1	1220	149	135.	35.7	802.1	*	1	2040	249	95.	35.5	802.1
1	0405	50	3.	32.1	800.8	*	1	1225	150	152.	35.8	802.2	*	1	2045	250	67.	35.5	802.1
1	0410	51	3.	32.1	800.8	*	1	1230	151	175.	35.9	802.2	*	1	2050	251	81.	35.5	802.1
1	0415	52	3.	32.1	800.8	*	1	1235	152	206.	36.0	802.2	*	1	2055	252	75.	35.4	802.0
1	0420	53	3.	32.1	800.8	*	1	1240	153	246.	36.2	802.3	*	1	2100	253	70.	35.4	802.0
1	0425	54	3.	32.1	800.8	*	1	1245	154	294.	36.4	802.4	*	1	2105	254	66.	35.4	802.0
1	0430	55	3.	32.1	800.8	*	1	1250	155	348.	36.6	802.5	*	1	2110	255	62.	35.4	802.0
1	0435	56	3.	32.1	800.8	*	1	1255	156	406.	36.9	802.5	*	1	2115	256	59.	35.4	802.0
1	0440	57	3.	32.1	800.8	*	1	1300	157	466.	37.1	802.6	*	1	2120	257	56.	35.3	802.0
1	0445	58	3.	32.1	800.8	*	1	1305	158	527.	37.4	802.7	*	1	2125	258	53.	35.3	802.0
1	0450	59	3.	32.1	800.8	*	1	1310	159	586.	37.6	802.8	*	1	2130	259	51.	35.3	802.0
1	0455	60	3.	32.1	800.8	*	1	1315	160	644.	37.9	802.9	*	1	2135	260	49.	35.3	802.0
1	0500	61	3.	32.1	800.8	*	1	1320	161	700.	38.1	803.0	*	1	2140	261	47.	35.3	802.0
1	0505	62	3.	32.1	800.8	*	1	1325	162	770.	38.3	803.0	*	1	2145	262	46.	35.3	802.0
1	0510	63	3.	32.1	800.8	*	1	1330	163	821.	38.4	803.1	*	1	2150	263	46.	35.3	802.0
1	0515	64	3.	32.1	800.8	*	1	1335	164	867.	38.5	803.1	*	1	2155	264	45.	35.3	802.0
1	0520	65	3.	32.1	800.8	*	1	1340	165	910.	38.6	803.1	*	1	2200	265	45.	35.3	802.0
1	0525	66	3.	32.1	800.8	*	1	1345	166	949.	38.7	803.2	*	1	2205	266	44.	35.2	802.0
1	0530	67	3.	32.1	800.8	*	1	1350	167	987.	38.8	803.2	*	1	2210	267	43.	35.2	802.0
1	0535	68	3.	32.1	800.8	*	1	1355	168	1022.	38.8	803.2	*	1	2215	268	43.	35.2	802.0
1	0540	69	3.	32.1	800.8	*	1	1400	169	1054.	38.9	803.2	*	1	2220	269	42.	35.2	802.0
1	0545	70	3.	32.1	800.8	*	1	1405	170	1085.	39.0	803.3	*	1	2225	270	42.	35.2	802.0
1	0550	71	3.	32.1	800.8	*	1	1410	171	1114.	39.0	803.3	*	1	2230	271	41.	35.1	801.9
1	0555	72	3.	32.1	800.8	*	1	1415	172	1143.	39.1	803.3	*	1	2235	272	40.	35.1	801.9
1	0600	73	3.	32.1	800.8	*	1	1420	173	1170.	39.2	803.3	*	1	2240	273	40.	35.1	801.9
1	0605	74	3.	32.1	800.8	*	1	1425	174	1197.	39.2	803.4	*	1	2245	274	40.	35.1	801.9
1	0610	75	3.	32.1	800.8	*	1	1430	175	1225.	39.3	803.4	*	1	2250	275	39.	35.1	801.9
1	0615	76	3.	32.1	800.8	*	1	1435	176	1253.	39.3	803.4	*	1	2255	276	39.	35.1	801.9
1	0620	77	3.	32.1	800.8	*	1	1440	177	1283.	39.4	803.4	*	1	2300	277	39.	35.1	801.9
1	0625	78	3.	32.1	800.8	*	1	1445	178	1313.	39.5	803.4	*	1	2305	278	38.	35.0	801.9
1	0630	79	3.	32.1	800.8	*	1	1450	179	1343.	39.5	803.5	*	1	2310	279	38.	35.0	801.9
1	0635	80	3.	32.1	800.8	*	1	1455	180	1373.	39.6	803.5	*	1	2315	280	38.	35.0	801.9
1	0640	81	3.	32.1	800.8	*	1	1500	181	1402.	39.7	803.5	*	1	2320	281	38.	35.0	801.9
1	0645	82	3.	32.1	800.8	*	1	1505	182	1430.	39.7	803.5	*	1	2325	282	38.	35.0	801.9
1	0650	83	3.	32.1	800.8	*	1	1510	183	1457.	39.8	803.5	*	1	2330	283	38.	35.0	801.9
1	0655	84	3.	32.1	800.8	*	1	1515	184	1483.	39.8	803.6	*	1	2335	284	38.	35.0	801.9
1	0700	85	3.	32.1	800.8	*	1	1520	185	1511.	39.9	803.6	*	1	2340	285	38.	35.0	801.9
1	0705	86	3.	32.1	800.8	*	1	1525	186	1543.	40.0	803.6	*	1	2345	286	38.	35.0	801.9
1	0710	87	3.	32.1	800.8	*	1	1530	187	1588.	40.0	803.6	*	1	2350	287	38.	35.0	801.9
1	0715	88	3.	32.1	800.8	*	1	1535	188	1659.	40.2	803.7	*	1	2355	288	37.	35.0	801.9
1	0720	89	3.	32.1	800.8	*	1	1540	189	1767.	40.4	803.8	*	2	0000	289	37.	35.0	801.9
1	0725	90	3.	32.1	800.8	*	1	1545	190	1910.	40.7	803.9	*	2	0005	290	37.	35.0	801.9
1	0730	91	3.	32.1	800.8	*	1	1550	191	2088.	41.1	804.0	*	2	0010	291	37.	35.0	801.9
1	0735	92	3.	32.2	800.8	*	1	1555	192	2322.	41.5	804.1	*	2	0015	292	37.	35.0	801.9
1	0740	93	3.	32.2	800.8	*	1	1600	193	2561.	41.9	804.3	*	2	0020	293	37.	35.0	801.9
1	0745	94	4.	32.2	800.8	*	1	1605	194	2825.	42.3	804.4	*	2	0025	294	37.	35.0	801.9
1	0750	95	5.	32.3	800.9	*	1	1610	195	3070.	42.7	804.5	*	2	0030	295	37.	35.0	801.9
1	0755	96	6.	32.4	800.9	*	1	1615	196	3274.	43.0	804.6	*	2	0035	296	36.	34.9	801.9
1	0800	97	8.	32.6	801.0	*	1	1620	197	3425.	43.2	804.7	*	2	0040	297	36.	34.9	801.9
1	0805	98	10.	32.7	801.0	*	1	1625	198	3516.	43.4	804.8	*	2	0045	298	35.	34.9	801.8
1	0810	99	13.	32.9	801.1	*	1	1630	199	3548.	43.4	804.8	*	2	0050	299	35.	34.8	801.8
1	0815	100	15.	33.2	801.2	*	1	1635	200	3532.	43.4	804.8	*	2	0055	300	34.	34.7	801.8

PEAK OUTFLOW IS 3548. AT TIME 16.50 HOURS

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	24.92-HR
3548.	16.50	(CFS)	1767.	497.	479.	479.
		(INCHES)	9.283	10.445	10.446	10.446
		(AC-FT)	876.	986.	986.	986.

PEAK STORAGE (AC-FT)	TIME (HR)	MAXIMUM AVERAGE STORAGE 6-HR	24-HR	72-HR	24.92-HR
43.	16.50	40.	36.	36.	36.

PEAK STAGE (FEET)	TIME (HR)	MAXIMUM AVERAGE STAGE 6-HR	24-HR	72-HR	24.92-HR
804.80	16.50	803.71	802.07	802.02	802.02

CUMULATIVE AREA = 1.77 SQ MI

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20 SS          SPILLWAY
                  CREL       801.00   SPILLWAY CREST ELEVATION
                  SPWID       12.00   SPILLWAY WIDTH
                  COQW         3.10   WEIR COEFFICIENT
                  EXPW         1.50   EXPONENT OF HEAD

21 ST          TOP OF DAM
                  TOPEL      802.00   ELEVATION AT TOP OF DAM
                  DAMWID      85.00   DAM WIDTH
                  COQD        -0.0    WEIR COEFFICIENT
                  EXPD         1.50   EXPONENT OF HEAD
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COMPUTED STORAGE-OUTFLOW CURVE

STORAGE	0.0	31.90	35.00	35.30	38.20	41.10	44.00	50.00	58.50
OUTFLOW	0.0	0.0	37.00	46.60	725.00	2087.00	3918.00	8798.00	18588.00

HYDROGRAPH AT STATION A2
PLAN 1, RATIO = 1.00

DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1		0000	1	0.	31.9	800.7
1		0005	2	0.	31.9	800.7
1		0010	3	1.	32.0	800.7
1		0015	4	1.	32.0	800.7
1		0020	5	1.	32.0	800.7
1		0025	6	2.	32.0	800.8
1		0030	7	2.	32.1	800.8
1		0035	8	2.	32.1	800.8
1		0040	9	3.	32.1	800.8
1		0045	10	3.	32.1	800.8
1		0050	11	3.	32.1	800.8
1		0055	12	3.	32.2	800.8
1		0100	13	3.	32.2	800.8
1		0105	14	3.	32.2	800.8
1		0110	15	4.	32.2	800.8
1		0115	16	4.	32.2	800.8
1		0120	17	4.	32.2	800.8
1		0125	18	4.	32.2	800.8
1		0130	19	4.	32.2	800.8
1		0135	20	4.	32.2	800.8
1		0140	21	4.	32.3	800.8
1		0145	22	4.	32.3	800.8
1		0150	23	4.	32.3	800.8
1		0155	24	4.	32.3	800.8
1		0200	25	5.	32.3	800.8
1		0205	26	5.	32.3	800.8
1		0210	27	5.	32.3	800.9
1		0215	28	5.	32.3	800.9
1		0220	29	5.	32.3	800.9
1		0225	30	5.	32.3	800.9
1		0230	31	5.	32.3	800.9
1		0235	32	5.	32.3	800.9
1		0240	33	5.	32.3	800.9
1		0245	34	5.	32.3	800.9
1		0250	35	5.	32.3	800.9
1		0255	36	5.	32.3	800.9
1		0300	37	5.	32.3	800.9
1		0305	38	5.	32.3	800.9
1		0310	39	5.	32.3	800.9
1		0315	40	5.	32.3	800.9
1		0320	41	5.	32.3	800.9
1		0325	42	5.	32.3	800.9
1		0330	43	5.	32.3	800.9
1		0335	44	5.	32.3	800.9
1		0340	45	5.	32.3	800.9
1		0345	46	5.	32.3	800.9
1		0350	47	5.	32.3	800.9

DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1		0820	101	37.	35.0	801.9
1		0825	102	77.	35.4	802.0
1		0830	103	128.	35.7	802.1
1		0835	104	144.	35.7	802.1
1		0840	105	156.	35.8	802.2
1		0845	106	166.	35.8	802.2
1		0850	107	174.	35.9	802.2
1		0855	108	181.	35.9	802.2
1		0900	109	187.	35.9	802.2
1		0905	110	193.	35.9	802.2
1		0910	111	196.	36.0	802.2
1		0915	112	202.	36.0	802.2
1		0920	113	205.	36.0	802.2
1		0925	114	209.	36.0	802.2
1		0930	115	211.	36.0	802.2
1		0935	116	214.	36.0	802.3
1		0940	117	216.	36.0	802.3
1		0945	118	218.	36.0	802.3
1		0950	119	219.	36.1	802.3
1		0955	120	221.	36.1	802.3
1		1000	121	222.	36.1	802.3
1		1005	122	223.	36.1	802.3
1		1010	123	224.	36.1	802.3
1		1015	124	225.	36.1	802.3
1		1020	125	226.	36.1	802.3
1		1025	126	226.	36.1	802.3
1		1030	127	227.	36.1	802.3
1		1035	128	227.	36.1	802.3
1		1040	129	228.	36.1	802.3
1		1045	130	228.	36.1	802.3
1		1050	131	229.	36.1	802.3
1		1055	132	229.	36.1	802.3
1		1100	133	229.	36.1	802.3
1		1105	134	229.	36.1	802.3
1		1110	135	230.	36.1	802.3
1		1115	136	230.	36.1	802.3
1		1120	137	230.	36.1	802.3
1		1125	138	230.	36.1	802.3
1		1130	139	230.	36.1	802.3
1		1135	140	230.	36.1	802.3
1		1140	141	230.	36.1	802.3
1		1145	142	230.	36.1	802.3
1		1150	143	230.	36.1	802.3
1		1155	144	231.	36.1	802.3
1		1200	145	231.	36.1	802.3
1		1205	146	232.	36.1	802.3
1		1210	147	231.	36.1	802.3

DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1		1640	201	6937.	47.7	806.2
1		1645	202	6741.	47.5	806.2
1		1650	203	6500.	47.2	806.1
1		1655	204	6219.	46.8	805.9
1		1700	205	5901.	46.4	805.8
1		1705	206	5563.	46.0	805.7
1		1710	207	5236.	45.6	805.5
1		1715	208	4943.	45.3	805.4
1		1720	209	4691.	44.9	805.3
1		1725	210	4471.	44.7	805.2
1		1730	211	4278.	44.4	805.1
1		1735	212	4106.	44.2	805.1
1		1740	213	3947.	44.0	805.0
1		1745	214	3804.	43.8	804.9
1		1750	215	3660.	43.6	804.9
1		1755	216	3526.	43.4	804.8
1		1800	217	3403.	43.2	804.7
1		1805	218	3290.	43.0	804.7
1		1810	219	3179.	42.8	804.6
1		1815	220	3068.	42.7	804.5
1		1820	221	2955.	42.5	804.5
1		1825	222	2836.	42.3	804.4
1		1830	223	2707.	42.1	804.3
1		1835	224	2566.	41.9	804.3
1		1840	225	2412.	41.6	804.2
1		1845	226	2247.	41.4	804.1
1		1850	227	2077.	41.1	804.0
1		1855	228	1917.	40.7	803.9
1		1900	229	1740.	40.4	803.7
1		1905	230	1571.	40.0	803.6
1		1910	231	1407.	39.7	803.5
1		1915	232	1255.	39.3	803.4
1		1920	233	1112.	39.0	803.3
1		1925	234	981.	38.8	803.2
1		1930	235	863.	38.5	803.1
1		1935	236	761.	38.3	803.0
1		1940	237	685.	38.1	803.0
1		1945	238	621.	37.8	802.9
1		1950	239	554.	37.5	802.8
1		1955	240	494.	37.2	802.7
1		2000	241	441.	37.0	802.6
1		2005	242	395.	36.8	802.5
1		2010	243	353.	36.6	802.5
1		2015	244	316.	36.5	802.4
1		2020	245	284.	36.3	802.4
1		2025	246	255.	36.2	802.3
1		2030	247	230.	36.1	802.3

1	0355	48	5.	32.3	800.9	1	1215	148	240.	36.2	802.3	1	2035	248	209.	36.0	802.[illegible]
1	0400	49	5.	32.3	800.9	1	1220	149	271.	36.3	802.3	1	2040	249	190.	35.9	802.[illegible]
1	0405	50	5.	32.3	800.9	1	1225	150	303.	36.4	802.4	1	2045	250	175.	35.9	802.[illegible]
1	0410	51	5.	32.3	800.9	1	1230	151	349.	36.6	802.5	1	2050	251	161.	35.8	802.2
1	0415	52	5.	32.3	800.9	1	1235	152	412.	36.9	802.5	1	2055	252	150.	35.8	802.2
1	0420	53	5.	32.3	800.9	1	1240	153	492.	37.2	802.7	1	2100	253	140.	35.7	802.1
1	0425	54	5.	32.3	800.9	1	1245	154	588.	37.7	802.8	1	2105	254	131.	35.7	802.1
1	0430	55	5.	32.3	800.9	1	1250	155	696.	38.1	803.0	1	2110	255	124.	35.6	802.1
1	0435	56	5.	32.3	800.9	1	1255	156	852.	38.5	803.1	1	2115	256	117.	35.6	802.1
1	0440	57	5.	32.3	800.9	1	1300	157	971.	38.7	803.2	1	2120	257	111.	35.6	802.1
1	0445	58	5.	32.3	800.9	1	1305	158	1093.	39.0	803.3	1	2125	258	106.	35.6	802.1
1	0450	59	5.	32.3	800.9	1	1310	159	1211.	39.2	803.4	1	2130	259	102.	35.5	802.1
1	0455	60	5.	32.3	800.9	1	1315	160	1327.	39.5	803.4	1	2135	260	98.	35.5	802.1
1	0500	61	5.	32.3	800.9	1	1320	161	1437.	39.7	803.5	1	2140	261	95.	35.5	802.1
1	0505	62	5.	32.3	800.9	1	1325	162	1542.	39.9	803.6	1	2145	262	92.	35.5	802.1
1	0510	63	5.	32.3	800.9	1	1330	163	1642.	40.2	803.7	1	2150	263	89.	35.5	802.1
1	0515	64	5.	32.3	800.9	1	1335	164	1734.	40.4	803.7	1	2155	264	87.	35.5	802.1
1	0520	65	5.	32.3	800.9	1	1340	165	1820.	40.5	803.8	1	2200	265	85.	35.5	802.1
1	0525	66	5.	32.3	800.9	1	1345	166	1899.	40.7	803.9	1	2205	266	83.	35.5	802.1
1	0530	67	5.	32.3	800.9	1	1350	167	1973.	40.9	803.9	1	2210	267	82.	35.5	802.1
1	0535	68	5.	32.3	800.9	1	1355	168	2043.	41.0	804.0	1	2215	268	80.	35.4	802.1
1	0540	69	5.	32.3	800.9	1	1400	169	2111.	41.1	804.0	1	2220	269	79.	35.4	802.0
1	0545	70	5.	32.3	800.9	1	1405	170	2176.	41.2	804.0	1	2225	270	78.	35.4	802.0
1	0550	71	5.	32.3	800.9	1	1410	171	2233.	41.3	804.1	1	2230	271	77.	35.4	802.0
1	0555	72	5.	32.3	800.9	1	1415	172	2290.	41.4	804.1	1	2235	272	76.	35.4	802.0
1	0600	73	5.	32.3	800.9	1	1420	173	2345.	41.5	804.1	1	2240	273	76.	35.4	802.0
1	0605	74	5.	32.3	800.9	1	1425	174	2399.	41.6	804.2	1	2245	274	75.	35.4	802.0
1	0610	75	5.	32.3	800.9	1	1430	175	2454.	41.7	804.2	1	2250	275	75.	35.4	802.0
1	0615	76	5.	32.3	800.9	1	1435	176	2511.	41.8	804.2	1	2255	276	75.	35.4	802.0
1	0620	77	5.	32.3	800.9	1	1440	177	2570.	41.9	804.3	1	2300	277	74.	35.4	802.0
1	0625	78	5.	32.3	800.9	1	1445	178	2630.	42.0	804.3	1	2305	278	74.	35.4	802.0
1	0630	79	5.	32.3	800.9	1	1450	179	2690.	42.1	804.3	1	2310	279	74.	35.4	802.0
1	0635	80	5.	32.3	800.9	1	1455	180	2750.	42.2	804.4	1	2315	280	74.	35.4	802.0
1	0640	81	5.	32.3	800.9	1	1500	181	2809.	42.2	804.4	1	2320	281	74.	35.4	802.0
1	0645	82	5.	32.3	800.9	1	1505	182	2865.	42.3	804.4	1	2325	282	74.	35.4	802.0
1	0650	83	5.	32.3	800.9	1	1510	183	2918.	42.4	804.5	1	2330	283	74.	35.4	802.0
1	0655	84	5.	32.3	800.9	1	1515	184	2971.	42.5	804.5	1	2335	284	74.	35.4	802.0
1	0700	85	5.	32.3	800.9	1	1520	185	3027.	42.6	804.5	1	2340	285	74.	35.4	802.0
1	0705	86	5.	32.3	800.9	1	1525	186	3091.	42.7	804.5	1	2345	286	74.	35.4	802.0
1	0710	87	5.	32.3	800.9	1	1530	187	3164.	42.8	804.6	1	2350	287	74.	35.4	802.0
1	0715	88	5.	32.3	800.9	1	1535	188	3332.	43.1	804.7	1	2355	288	74.	35.4	802.0
1	0720	89	5.	32.3	800.9	1	1540	189	3553.	43.4	804.8	2	0000	289	74.	35.4	802.0
1	0725	90	5.	32.4	800.9	1	1545	190	3845.	43.9	805.0	2	0005	290	74.	35.4	802.0
1	0730	91	6.	32.4	800.9	1	1550	191	4226.	44.4	805.1	2	0010	291	74.	35.4	802.0
1	0735	92	6.	32.4	800.9	1	1555	192	4656.	44.9	805.3	2	0015	292	73.	35.4	802.0
1	0740	93	7.	32.5	800.9	1	1600	193	5154.	45.5	805.5	2	0020	293	72.	35.4	802.0
1	0745	94	8.	32.6	801.0	1	1605	194	5677.	46.2	805.7	2	0025	294	70.	35.4	802.0
1	0750	95	10.	32.8	801.0	1	1610	195	6165.	46.8	805.9	2	0030	295	68.	35.4	802.0
1	0755	96	13.	33.0	801.1	1	1615	196	6568.	47.3	806.1	2	0035	296	65.	35.4	802.0
1	0800	97	16.	33.3	801.2	1	1620	197	6864.	47.6	806.2	2	0040	297	62.	35.4	802.0
1	0805	98	20.	33.6	801.4	1	1625	198	7038.	47.8	806.3	2	0045	298	58.	35.4	802.0
1	0810	99	25.	34.0	801.5	1	1630	199	7098.	47.9	806.3	2	0050	299	54.	35.3	802.0
1	0815	100	31.	34.5	801.7	1	1635	200	7061.	47.9	806.3	2	0055	300	50.	35.3	802.0

EAK OUTFLOW IS 7098. AT TIME 16.50 HOURS

PEAK FLOW (CFS)	TIME (HR)		6-HR	MAXIMUM AVERAGE FLOW 24-HR	72-HR	24.92-HR
7098.	16.50	(CFS)	3535.	995.	959.	959.
		(INCHES)	18.570	20.916	20.918	20.918
		(AC-FT)	1753.	1974.	1975.	1975.

EAK STORAGE (AC-FT)	TIME (HR)	6-HR	MAXIMUM AVERAGE STORAGE 24-HR	72-HR	24.92-HR
48.	16.50	43.	37.	37.	37.

PEAK STAGE (FEET)	TIME (HR)	6-HR	MAXIMUM AVERAGE STAGE 24-HR	72-HR	24.92-HR
806.30	16.50	804.[illegible]	802.[illegible]	802.38	802.38

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES
TIME TO PEAK IN HOURS

					RATIOS APPLIED TO FLOWS			
OPERATION	STATION	AREA	PLAN		RATIO 1 0.10	RATIO 2 0.25	RATIO 3 0.50	RATIO 4 1.00
HYDROGRAPH AT	A1	1.77	1	FLOW	710.	1775.	3549.	7099.
				TIME	16.50	16.50	16.50	16.50
ROUTED TO	A2	1.77	1	FLOW	707.	1773.	3548.	7098.
				TIME	16.58	16.50	16.50	16.50
			** PEAK STAGES IN FEET **					
			1	STAGE	802.99	803.77	804.80	806.30
				TIME	16.58	16.50	16.50	16.50

SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION A2

PLAN 1

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	800.70	801.00	802.00
STORAGE	32.	33.	35.
OUTFLOW	0.	9.	46.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.10	802.99	0.99	38.	707.	7.00	16.58	0.0
0.25	803.77	1.77	40.	1773.	10.75	16.50	0.0
0.50	804.80	2.80	43.	3548.	12.92	16.50	0.0
1.00	806.30	4.30	48.	7098.	16.58	16.50	0.0

*** NORMAL END OF JOB ***

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 LINE      ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

   1       ID     MINE HILL RESERVOIR DAM    BREACH ANALYSIS    TOM GOOCH    ANCO
   2       ID     NEW JERSEY DAM NO.777 - MORRIS COUNTY - MOUNT OLIVE TOWNSHIP
   3       IT       1               0      100
   4       IO       2       1

   5       KK      A1  MINE HILL RESERVOIR INFLOW HYDROGRAPH
   6       QI     40.     40.     40.     40.     50.     50.

   7       KK      A2  ROUTE INFLOW HYDROGRAPH THROUGH MINE HILL RESERVOIR
   8       KO       2       2
   9       RS       1    FLOW    40.0
  10       SV       0    31.9     35.    35.3    38.2    41.1     44.     50.    58.5
  11       SE     775.  800.7   801.9    802.    803.    804.    805.    807.    810.
  12       SQ      0.      0.     37.     46.    715.   2087.   3918.   8798.  18588.
  13       SE     775.  800.7   801.9    802.    803.    804.    805.    807.    810.
  14       SS    801.0    12.     3.1     1.5
  15       ST    802.0   85.8     0.0     1.5
  16       SB     775.    80.      0.     0.1    802.

  17       KK      A3  ROUTE OUTFLOW HYDROGRAPH TO DAMAGE CENTER
  18       KO       2       2
  19       RS       1    FLOW     40.
  20       RC     .10     .05     .10   3400.     .05
  21       RX       0    59.8    59.9     60.     75.    75.1    175.    475.
  22       RY     610.   604.    602.    600.    600.    602.    604.    610.
  23       ZZ
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FLOOD HYDROGRAPH PACKAGE   (HEC-1)
        FEBRUARY 1981

RUN DATE06/24/81      TIME16.56.12

                                              U.S. ARMY CORPS OF ENGINEERS
                                           THE HYDROLOGIC ENGINEERING CENTER
                                                   609 SECOND STREET
                                                DAVIS, CALIFORNIA 95616
                                           (916) 440-3285 OR (FTS) 448-3285

              MINE HILL RESERVOIR DAM   BREACH ANALYSIS    TOM GOOCH    ANCO
              NEW JERSEY DAM NO.777 - MORRIS COUNTY - MOUNT OLIVE TOWNSHIP

 4 IO        OUTPUT CONTROL VARIABLES
                    IPRNT          2    PRINT CONTROL
                    IPLOT          1    PLOT CONTROL
                    QSCAL          0.   HYDROGRAPH PLOT SCALE
                    IPMSG        YES    PRINT DIAGNOSTIC MESSAGES

   IT        HYDROGRAPH TIME DATA
                    NMIN           1    MINUTES IN COMPUTATION INTERVAL
                    IDATE      1   0    STARTING DATE
                    ITIME       0000    STARTING TIME
                       NQ        100    NUMBER OF HYDROGRAPH ORDINATES
                    NDDATE     1   0    ENDING DATE
                    NDTIME      0139    ENDING TIME

             COMPUTATION INTERVAL     0.02 HOURS
                  TOTAL TIME BASE     1.65 HOURS

        ENGLISH UNITS
           DRAINAGE AREA           SQUARE MILES
           PRECIPITATION DEPTH     INCHES
           LENGTH, ELEVATION       FEET
           FLOW                    CUBIC FEET PER SECOND
           STORAGE VOLUME          ACRE-FEET
           SURFACE AREA            ACRES
           TEMPERATURE             DEGREES FAHRENHEIT

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

             **************
             *            *
 5 KK        *       A1   *     MINE HILL RESERVOIR INFLOW HYDROGRAPH
             *            *
             **************

              SUBBASIN RUNOFF DATA

 0 BA         SUBBASIN CHARACTERISTICS
                    TAREA         0.0    SUBBASIN AREA

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                                  HYDROGRAPH AT STATION      A1

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DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW
1		0000	1	40.	1		0025	26	50.	1		0050	51	50.	1		0115	76	50.
1		0001	2	40.	1		0026	27	50.	1		0051	52	50.	1		0116	77	50.
1		0002	3	40.	1		0027	28	50.	1		0052	53	50.	1		0117	78	50.
1		0003	4	40.	1		0028	29	50.	1		0053	54	50.	1		0118	79	50.
1		0004	5	50.	1		0029	30	50.	1		0054	55	50.	1		0119	80	50.
1		0005	6	50.	1		0030	31	50.	1		0055	56	50.	1		0120	81	50.
1		0006	7	50.	1		0031	32	50.	1		0056	57	50.	1		0121	82	50.
1		0007	8	50.	1		0032	33	50.	1		0057	58	50.	1		0122	83	50.
1		0008	9	50.	1		0033	34	50.	1		0058	59	50.	1		0123	84	50.
1		0009	10	50.	1		0034	35	50.	1		0059	60	50.	1		0124	85	50.
1		0010	11	50.	1		0035	36	50.	1		0100	61	50.	1		0125	86	50.
1		0011	12	50.	1		0036	37	50.	1		0101	62	50.	1		0126	87	50.
1		0012	13	50.	1		0037	38	50.	1		0102	63	50.	1		0127	88	50.
1		0013	14	50.	1		0038	39	50.	1		0103	64	50.	1		0128	89	50.
1		0014	15	50.	1		0039	40	50.	1		0104	65	50.	1		0129	90	50.
1		0015	16	50.	1		0040	41	50.	1		0105	66	50.	1		0130	91	50.
1		0016	17	50.	1		0041	42	50.	1		0106	67	50.	1		0131	92	50.
1		0017	18	50.	1		0042	43	50.	1		0107	68	50.	1		0132	93	50.
1		0018	19	50.	1		0043	44	50.	1		0108	69	50.	1		0133	94	50.
1		0019	20	50.	1		0044	45	50.	1		0109	70	50.	1		0134	95	50.
1		0020	21	50.	1		0045	46	50.	1		0110	71	50.	1		0135	96	50.
1		0021	22	50.	1		0046	47	50.	1		0111	72	50.	1		0136	97	50.
1		0022	23	50.	1		0047	48	50.	1		0112	73	50.	1		0137	98	50.
1		0023	24	50.	1		0048	49	50.	1		0113	74	50.	1		0138	99	50.
1		0024	25	50.	1		0049	50	50.	1		0114	75	50.	1		0139	100	50.

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	1.65-HR
50.	0.07	(CFS)	50.	50.	50.	50.
		(INCHES)	0.000	0.000	0.000	0.000
		(AC-FT)	7.	7.	7.	7.

CUMULATIVE AREA = 0.0 SQ MI

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7 KK A2 ROUTE INFLOW HYDROGRAPH THROUGH MINE HILL RESERVOIR

8 KO OUTPUT CONTROL VARIABLES

IPRNT	2	PRINT CONTROL
IPLOT	200	PLOT CONTROL
QSCAL	0.	HYDROGRAPH PLOT SCALE

HYDROGRAPH ROUTING DATA

9 RS STORAGE ROUTING

NSTPS	1	NUMBER OF SUBREACHES
ITYP	FLOW	TYPE OF INITIAL CONDITION
RSVRIC	40.00	INITIAL CONDITION
X	0.0	WORKING R AND D COEFFICIENT

10 SV	STORAGE	0.0	31.9	35.0	35.3	38.2	41.1	44.0	50.0	58.5
11 SE	ELEVATION	775.00	800.70	801.90	802.00	803.00	804.00	805.00	807.00	810.00
12 SQ	DISCHARGE	0.	0.	37.	46.	715.	2087.	3918.	8798.	18588.
13 SE	ELEVATION	775.00	800.70	801.90	802.00	803.00	804.00	805.00	807.00	810.00

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14 SS          SPILLWAY
                   CREL      801.00   SPILLWAY CREST ELEVATION
                   SPWID      12.00   SPILLWAY WIDTH
                   COQW        3.10   WEIR COEFFICIENT
                   EXPW        1.50   EXPONENT OF HEAD

15 ST          TOP OF DAM
                   TOPEL     802.00   ELEVATION AT TOP OF DAM
                   DAMWID     85.00   DAM WIDTH
                   COQD        0.0    WEIR COEFFICIENT
                   EXPD        1.50   EXPONENT OF HEAD

16 SB          BREACH DATA
                   ELBM      775.00   ELEVATION AT BOTTOM OF BREACH
                   BRWID      80.00   WIDTH OF BREACH BOTTOM
                   Z           0.0    BREACH SIDE SLOPE
                   TFAIL       0.10   TIME FOR BREACH TO DEVELOP
                   FAILEL    802.00   W.S. ELEVATION TO TRIGGER FAILURE

                                   ***

                          COMPUTED STORAGE-OUTFLOW CURVE
        STORAGE     0.0    31.90    35.00    35.30    38.20     41.10     44.00     50.00     58.50

        OUTFLOW     0.0     0.0     37.00    46.00   715.00   2087.00   3918.00   8798.00  18588.00

BEGIN DAM FAILURE AT  0.45 HOURS
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HYDROGRAPH AT STATION A2

DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1		0000	1	40.	35.1	801.9
1		0001	2	40.	35.1	801.9
1		0002	3	40.	35.1	801.9
1		0003	4	40.	35.1	801.9
1		0004	5	40.	35.1	801.9
1		0005	6	41.	35.1	801.9
1		0006	7	41.	35.1	801.9
1		0007	8	41.	35.1	801.9
1		0008	9	42.	35.2	802.0
1		0009	10	42.	35.2	802.0
1		0010	11	42.	35.2	802.0
1		0011	12	43.	35.2	802.0
1		0012	13	43.	35.2	802.0
1		0013	14	43.	35.2	802.0
1		0014	15	43.	35.2	802.0
1		0015	16	44.	35.2	802.0
1		0016	17	44.	35.2	802.0
1		0017	18	44.	35.2	802.0
1		0018	19	44.	35.2	802.0
1		0019	20	45.	35.3	802.0
1		0020	21	45.	35.3	802.0
1		0021	22	45.	35.3	802.0
1		0022	23	45.	35.3	802.0
1		0023	24	45.	35.3	802.0
1		0024	25	46.	35.3	802.0
1		0025	26	46.	35.3	802.0
1		0026	27	46.	35.3	802.0
1		0027	28	46.	35.3	802.0
1		0028	29	427.	35.1	801.9
1		0029	30	2017.	33.7	801.4
1		0030	31	4025.	29.4	799.7
1		0031	32	4966.	23.2	793.7
1		0032	33	5167.	16.2	788.1
1		0033	34	5030.	9.3	782.6

DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1		0034	35	1965.	5.0	779.0
1		0035	36	975.	3.1	777.5
1		0036	37	562.	2.2	776.7
1		0037	38	360.	1.6	776.3
1		0038	39	250.	1.3	776.0
1		0039	40	185.	1.0	775.8
1		0040	41	144.	0.9	775.7
1		0041	42	118.	0.8	775.6
1		0042	43	99.	0.7	775.5
1		0043	44	87.	0.6	775.5
1		0044	45	77.	0.6	775.5
1		0045	46	71.	0.5	775.4
1		0046	47	66.	0.5	775.4
1		0047	48	62.	0.5	775.4
1		0048	49	59.	0.5	775.4
1		0049	50	57.	0.5	775.4
1		0050	51	55.	0.5	775.4
1		0051	52	54.	0.5	775.4
1		0052	53	53.	0.4	775.4
1		0053	54	52.	0.4	775.4
1		0054	55	52.	0.4	775.4
1		0055	56	51.	0.4	775.4
1		0056	57	51.	0.4	775.3
1		0057	58	50.	0.4	775.3
1		0058	59	50.	0.4	775.3
1		0059	60	50.	0.4	775.3
1		0100	61	50.	0.4	775.3
1		0101	62	50.	0.4	775.3
1		0102	63	50.	0.4	775.3
1		0103	64	50.	0.4	775.3
1		0104	65	50.	0.4	775.3
1		0105	66	50.	0.4	775.3
1		0106	67	50.	0.4	775.3
1		0107	68	50.	0.4	775.3

DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1		0108	69	50.	0.4	775.3
1		0109	70	50.	0.4	775.3
1		0110	71	50.	0.4	775.3
1		0111	72	50.	0.4	775.3
1		0112	73	50.	0.4	775.3
1		0113	74	50.	0.4	775.3
1		0114	75	50.	0.4	775.3
1		0115	76	50.	0.4	775.3
1		0116	77	50.	0.4	775.3
1		0117	78	50.	0.4	775.3
1		0118	79	50.	0.4	775.3
1		0119	80	50.	0.4	775.3
1		0120	81	50.	0.4	775.3
1		0121	82	50.	0.4	775.3
1		0122	83	50.	0.4	775.3
1		0123	84	50.	0.4	775.3
1		0124	85	50.	0.4	775.3
1		0125	86	50.	0.4	775.3
1		0126	87	50.	0.4	775.3
1		0127	88	50.	0.4	775.3
1		0128	89	50.	0.4	775.3
1		0129	90	50.	0.4	775.3
1		0130	91	50.	0.4	775.3
1		0131	92	50.	0.4	775.3
1		0132	93	50.	0.4	775.3
1		0133	94	50.	0.4	775.3
1		0134	95	50.	0.4	775.3
1		0135	96	50.	0.4	775.3
1		0136	97	50.	0.4	775.3
1		0137	98	50.	0.4	775.3
1		0138	99	50.	0.4	775.3
1		0139	100	50.	0.4	775.3

```
PEAK OUTFLOW IS    5168. AT TIME   0.53 HOURS

PEAK FLOW      TIME                                  MAXIMUM AVERAGE FLOW
  (CFS)        (HR)                      6-HR        24-HR       72-HR      1.65-HR
  5167.        0.53          (CFS)       308.        308.        308.        308.
                          (INCHES)      0.000       0.000       0.000       0.000
                           (AC-FT)        42.         42.         42.         42.

PEAK STORAGE   TIME                                MAXIMUM AVERAGE STORAGE
  (AC-FT)      (HR)                      6-HR        24-HR       72-HR      1.65-HR
     35.       0.45                       12.         12.         12.         12.

PEAK STAGE     TIME                                MAXIMUM AVERAGE STAGE
  (FEET)       (HR)                      6-HR        24-HR       72-HR      1.65-HR
  802.00       0.45                    784.00      784.00      784.00      784.00

                        CUMULATIVE AREA =      0.0  SQ MI

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

            **************
            *            *
  17 KK     *      A3    *       ROUTE OUTFLOW HYDROGRAPH TO DAMAGE CENTER
            *            *
            **************

  18 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           2  PRINT CONTROL
                      IPLOT           2  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

                 HYDROGRAPH ROUTING DATA

  19 RS          STORAGE ROUTING
                      NSTPS           1  NUMBER OF SUBREACHES
                      ITYP         FLOW  TYPE OF INITIAL CONDITION
                      RSVRIC      40.00  INITIAL CONDITION
                      X             0.0  WORKING R AND D COEFFICIENT

  20 RC          NORMAL DEPTH CHANNEL ROUTING
                      ANL         0.100  LEFT OVERBANK N-VALUE
                      ANCH        0.050  MAIN CHANNEL N-VALUE
                      ANR         0.100  RIGHT OVERBANK N-VALUE
                      RLNTH       3400.  REACH LENGTH
                      SEL        0.0500  ENERGY SLOPE
                      ELMAX         0.0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                     CROSS-SECTION DATA
                        --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
  22 RY       ELEVATION    610.00    604.00    602.00    600.00    600.00    602.00    604.00    610.00
  21 RX       DISTANCE        0.0     59.80     59.90     60.00     75.00     75.10    175.00    475.00

                                              ***

                                  COMPUTED STORAGE-OUTFLOW CURVE
              STORAGE       0.0      0.62      1.24      1.86      2.50      3.88      6.34      9.08     14.52     20.41
                          27.60     36.08     45.86     56.94     69.31     82.98     97.94    114.20    131.75    150.60

              OUTFLOW       0.0     32.85    100.26    192.52    298.60    449.17    666.00    971.96   1386.54   1930.96
                        2627.39   3495.60   4554.22   5820.39   7310.75   9041.23  11027.10  13283.48  15824.57  18664.61

              ELEVATION  [illegible]
```

HYDROGRAPH AT STATION A3

DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1		0000	1	40.	0.7	600.6	1		0034	35	2156.	22.7	604.9	1		0108	69	66.	0.9	600.8
1		0001	2	40.	0.7	600.6	1		0035	36	2071.	21.9	604.8	1		0109	70	64.	0.9	600.8
1		0002	3	40.	0.7	600.6	1		0036	37	1909.	20.2	604.7	1		0110	71	62.	0.9	600.[illegible]
1		0003	4	40.	0.7	600.6	1		0037	38	1736.	18.3	604.5	1		0111	72	60.	0.9	600.7
1		0004	5	40.	0.7	600.6	1		0038	39	1564.	16.4	604.4	1		0112	73	59.	0.9	600.7
1		0005	6	40.	0.7	600.6	1		0039	40	1403.	14.7	604.2	1		0113	74	58.	0.8	600.7
1		0006	7	40.	0.7	600.6	1		0040	41	1259.	13.1	604.0	1		0114	75	57.	0.8	600.7
1		0007	8	40.	0.7	600.6	1		0041	42	1126.	11.6	603.9	1		0115	76	56.	0.8	600.7
1		0008	9	40.	0.7	600.6	1		0042	43	1010.	10.3	603.7	1		0116	77	55.	0.8	600.[illegible]
1		0009	10	41.	0.7	600.6	1		0043	44	906.	9.1	603.6	1		0117	78	54.	0.8	600.7
1		0010	11	41.	0.7	600.6	1		0044	45	813.	8.0	603.4	1		0118	79	54.	0.8	600.[illegible]
1		0011	12	41.	0.7	600.6	1		0045	46	730.	7.1	603.3	1		0119	80	53.	0.8	600.7
1		0012	13	41.	0.7	600.6	1		0046	47	655.	6.2	603.1	1		0120	81	53.	0.8	600.[illegible]
1		0013	14	42.	0.7	600.6	1		0047	48	588.	5.5	603.0	1		0121	82	52.	0.8	600.[illegible]
1		0014	15	42.	0.7	600.6	1		0048	49	527.	4.8	602.8	1		0122	83	52.	0.8	600.
1		0015	16	42.	0.7	600.6	1		0049	50	474.	4.2	602.7	1		0123	84	52.	0.8	600.
1		0016	17	42.	0.7	600.6	1		0050	51	421.	3.6	602.5	1		0124	85	52.	0.8	600.
1		0017	18	43.	0.7	600.6	1		0051	52	369.	3.2	602.4	1		0125	86	51.	0.8	600.
1		0018	19	43.	0.7	600.6	1		0052	53	325.	2.7	602.2	1		0126	87	51.	0.8	600.
1		0019	20	43.	0.7	600.6	1		0053	54	281.	2.4	602.0	1		0127	88	51.	0.8	600.
1		0020	21	43.	0.7	600.6	1		0054	55	234.	2.1	601.8	1		0128	89	51.	0.8	600.
1		0021	22	43.	0.7	600.6	1		0055	56	196.	1.9	601.6	1		0129	90	51.	0.8	600.
1		0022	23	44.	0.7	600.6	1		0056	57	169.	1.7	601.5	1		0130	91	51.	0.8	600.
1		0023	24	44.	0.7	600.6	1		0057	58	147.	1.6	601.3	1		0131	92	51.	0.8	600.
1		0024	25	44.	0.7	600.6	1		0058	59	130.	1.4	601.2	1		0132	93	51.	0.8	600.
1		0025	26	44.	0.7	600.6	1		0059	60	115.	1.3	601.1	1		0133	94	50.	0.8	600.
1		0026	27	45.	0.7	600.6	1		0100	61	104.	1.3	601.1	1		0134	95	50.	0.8	600.
1		0027	28	45.	0.7	600.6	1		0101	62	95.	1.2	601.0	1		0135	96	50.	0.8	600.
1		0028	29	72.	1.0	600.8	1		0102	63	89.	1.1	601.0	1		0136	97	50.	0.8	600.
1		0029	30	283.	2.4	602.0	1		0103	64	84.	1.1	600.9	1		0137	98	50.	0.8	600.[illegible]
1		0030	31	631.	5.9	603.1	1		0104	65	79.	1.0	600.9	1		0138	99	50.	0.8	600.
1		0031	32	1069.	11.0	603.8	1		0105	66	75.	1.0	600.9	1		0139	100	50.	0.8	600.
1		0032	33	1537.	16.1	604.4	1		0106	67	71.	1.0	600.8							
1		0033	34	1965.	20.8	604.8	1		0107	68	68.	0.9	600.8							

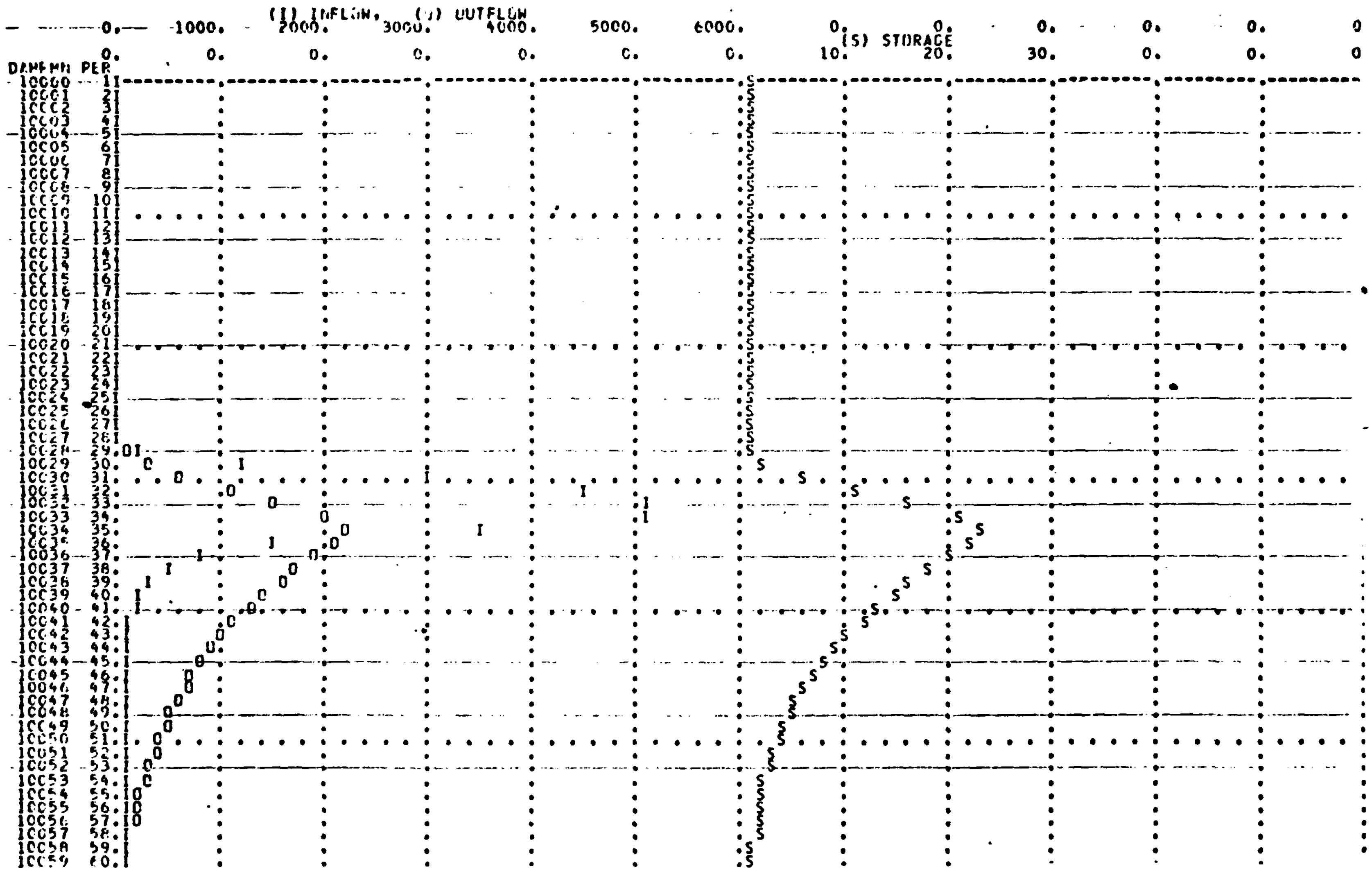
PEAK FLOW (CFS)	TIME (HR)		6-HR	MAXIMUM AVERAGE FLOW 24-HR	72-HR	1.65-HR
2156.	0.57	(CFS)	307.	307.	307.	307.
		(INCHES)	0.000	0.000	0.000	0.000
		(AC-FT)	42.	42.	42.	42.

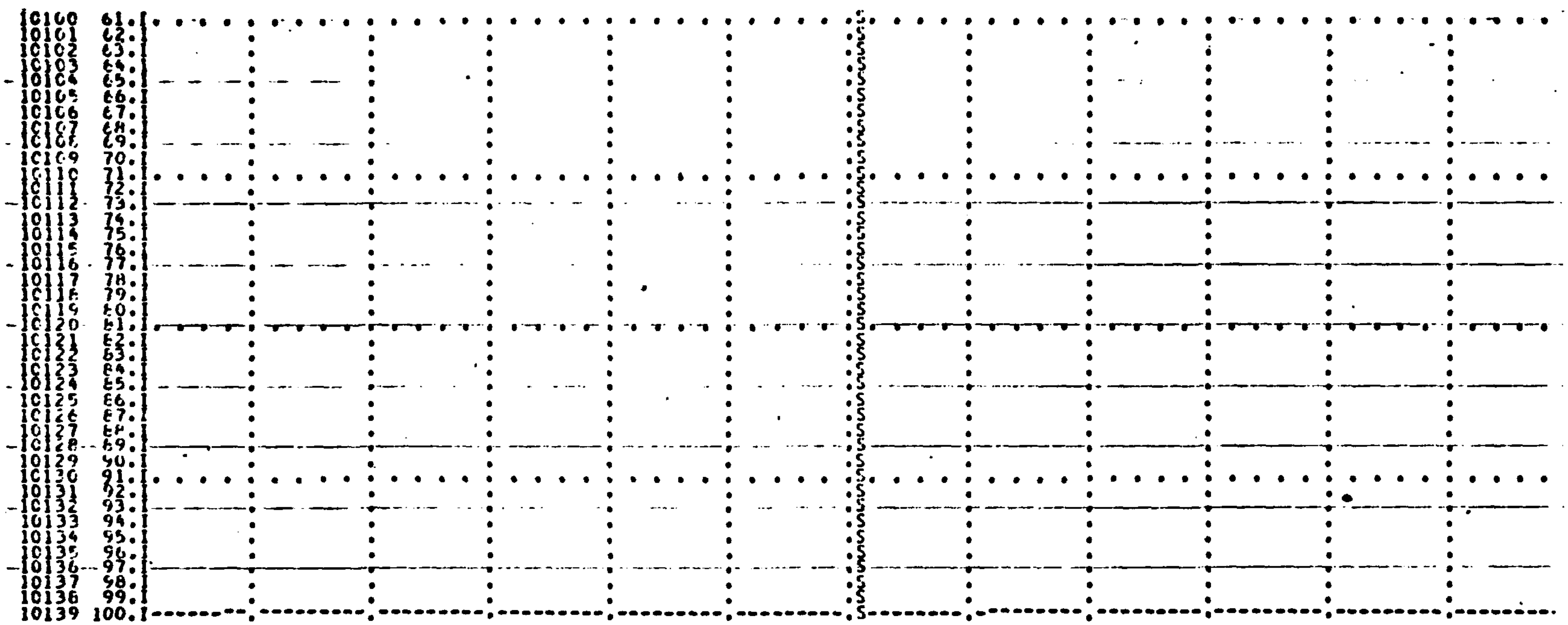
PEAK STORAGE (AC-FT)	TIME (HR)	6-HR	MAXIMUM AVERAGE STORAGE 24-HR	72-HR	1.65-HR
23.	0.57	3.	3.	3.	3.

PEAK STAGE (FEET)	TIME (HR)	6-HR	MAXIMUM AVERAGE STAGE 24-HR	72-HR	1.65-HR
604.91	0.57	601.44	601.44	601.44	601.44

CUMULATIVE AREA = 0.0 SQ MI

STATION A3


(I) INFLOW, (O) OUTFLOW
0. 1000. 2000. 3000. 4000. 5000. 6000.
(S) STORAGE
0. 10. 20. 30.
DAHRMN PER


10100 61.
10101 62.
10102 63.
10103 64.
10104 65.
10105 66.
10106 67.
10107 68.
10108 69.
10109 70.
10110 71.
10111 72.
10112 73.
10113 74.
10114 75.
10115 76.
10116 77.
10117 78.
10118 79.
10119 80.
10120 81.
10121 82.
10122 83.
10123 84.
10124 85.
10125 86.
10126 87.
10127 88.
10128 89.
10129 90.
10130 91.
10131 92.
10132 93.
10133 94.
10134 95.
10135 96.
10136 97.
10137 98.
10138 99.
10139 100.

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
HYDROGRAPH AT	A1	50.	0.07	50.	50.	50.	0.0		
ROUTED TO	A2	5167.	0.53	308.	308.	308.	0.0	802.00	0.45
ROUTED TO	A3	2156.	0.57	307.	307.	307.	0.0	604.91	0.57

SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION A2

PLAN 1

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	801.93	801.00	802.00
STORAGE	35.	33.	35.
OUTFLOW	40.	32676.	34615.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	802.00	0.00	35.	5168.	0.02	0.53	0.45

*** NORMAL END OF JOB ***

APPENDIX 6
<u>REFERENCES</u>

MINE HILL RESERVOIR DAM.

APPENDIX 6
REFERENCES

MINE HILL RESERVOIR DAM

Chow, Ven Te, Open Channel Hydraulics, McGraw Hill Book Company, New York, 1959.

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Viessman, Warren, Jr., J.W. Knapp, G.L. Lewis, T.E. Harbaugh, Introduction to Hydrology, Harper and Row, Publishers, New York, Second Edition 1977, 704 pp.

PART I – INVENTORY OF DAMS IN THE UNITED STATES
(PURSUANT TO PUBLIC LAW 92-367)

See reverse side for instructions.

IDENTIFICATION

	[2] DIVISION	[3] STATE	[4] COUNTY	[5] CONGR DIST	[6] STATE	[7] COUNTY	[8] CONGR DIST	[9] NAME
Columns	8 9 10	11 12	13 14 15	16 17	18 19	20 21 22	23 24	25 – 50
IDENTIFICATION	NAD	NJ	027	13				MINE HILL RESERVOIR DAM

IDENTIFICATION (Continued)

	[13] POPULAR NAME	
Columns	8 – 43	44 – 50
IDENTIFICATION (Continued)	LOWER MINE HILL RESERVOIR DAM	MINE HI

LOCATION

	[15] REGION	[16] BASIN	[17] RIVER OR STREAM	N CIT
Columns	8 9	10 11	12 – 40	41 – 50
LOCATION	02	04	MINE BROOK	HACKETTSTO

STATISTICS

	[21] TYPE OF DAM	[22] YEAR COMPLETED	[23] PURPOSES	[24] STRUCTURAL HEIGHT (ft)	[25] HYDRAULIC HEIGHT (ft)	[26] IMPOUNDING CA MAXIMUM (acre – ft.)	
Columns	8 – 19	20 – 23	24 – 33	34 – 37	38 – 41	42 – 49	50
STATISTICS	PG	1896	S	30	27	35	3

REMARKS

	[28] REMARKS
Columns	8 – 50
REMARKS	

'ES

STATE 1	2	IDENTITY NUMBER 3	4	5	6	7
N	J	0	0	7	7	7

[9] [10] [11] [12]

NAME (cols. 42–61)	LATITUDE (North) ° ' (62–66)	LONGITUDE (West) ° ' (67–72)	REPORT DATE DAY MO YR (73–79)	80
R DAM	4050.5	07448.0		0

[14]

(42–43)	NAME OF IMPOUNDMENT (44–79)	80
	MINE HILL RESERVOIR	1

[18] [19] [20]

NEAREST DOWNSTREAM CITY – TOWN – VILLAGE (42–68)	DIST. FROM DAM (mi) (69–71)	POPULATION (72–79)	80
ACKETTSTOWN	001	9472	2

[26] [27] [27A] [27B] [27C] [27D] [27E] [27F]

IMPOUNDING CAPACITIES MAXIMUM (acre – ft.)	NORMAL (acre – ft.)	CORPS ENGR. DIST.	OWN.	FED. R.	PRV/FED	SCS A.	VERIFICATION DATE DA MO YR	BLANK	80
35	32	NAP	N	N	N	N			3

[28]

REMARKS (42–79)	80
	4

PART II – INVENTORY OF DAMS IN THE UNITED STATES

(PURSUANT TO PUBLIC LAW 92-367)

See reverse side for instructions.

STATISTICS

[29] D/S HAZ	[30] CREST LENGTH (ft)	[31] SPILLWAY TYPE	[32] SPILLWAY WIDTH (ft)	[33] SPILLWAY MAXIMUM DISCHARGE (cfs)	[34] VOLUME OF DAM (CY)	[35] POWER CAPACITY INSTALLED (MW)	[36] POWER CAPACITY PROPOSED (MW)	[37] NO.	[38] LENGTH (ft)
2	310	4	40	46					

MISC. DATA

[46] OWNER	[47] ENGINEERING BY
HACKETTSTOWN MUN UT AUTH	

MISC. DATA (Continued)

[49] REGULATORY AGENCY – DESIGN	[50] REGULATORY AGENCY – CONSTRUCTION	REGULATORY AGENCY – OPERATION
		NJDEP

MISC. DATA (Continued)

[53] INSPECTION BY	[54] INSPECTION DATE (DAY / MO / YR)
ANDERSON-NICHOLS + CO. INC	21 APR 81

REMARKS

[56] REMARKS
#32 - 4 weirs - 12ft, 12ft, 10.5ft, +5ft

ITED STATES
7)

FORM APPROVED
OMB NO. 49–R0421

REQUIREMENTS CONTROL SYMBOL
DAEN–CWE–17

STATE		IDENTITY NUMBER				
1	2	3	4	5	6	7
N	J	0	0	7	7	7

[35] [36] [37] [38] [39] [40] [41] [42] [43] [44] [45]

POWER CAPACITY									NAVIGATION LOCKS																													BLANK				
LLED (MW)			PROPOSED (MW)						NO.	LENGTH (ft)				WIDTH (ft)			LENGTH (ft)				WIDTH (ft)			LENGTH (ft)				WIDTH (ft)			LENGTH (ft)				WIDTH (ft)							
38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
																																										5

[47] [48]

ENGINEERING BY																		CONSTRUCTION BY																								
38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
																																										6

[51] [52]

REGULATORY AGENCY																																										
						OPERATION																		MAINTENANCE																		
38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
						N	J	D	E	P														N	J	D	E	P														7

[54] [55]

			INSPECTION DATE							AUTHORITY FOR INSPECTION																																
			DAY		MO			YR																																		
38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
			2	1	A	P	R	8	1																																	8

[56]

REMARKS																																										
38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
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